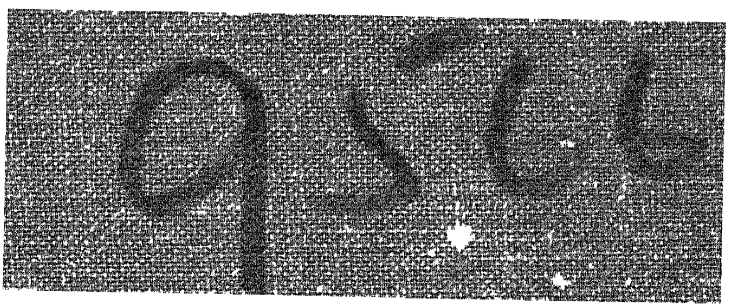

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ARMS AND ARMAMENT

THE ARSENAL, BY LEONARDO DA VINCI

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ARMS & ARMAMENT

AN HISTORICAL SURVEY OF THE WEAPONS OF THE BRITISH ARMY

BY

CHARLES FFOULKES

C B O B E O S T J HON D LITT (OXON)

MASTER OF THE TOWER ARMOURIES 1913–38

AUTHOR OF

ARMOUR AND WEAPONS — SWORD, LANCE, AND BAYONET

THE GUNFOUNDERS OF ENGLAND — THE ARMOURER AND HIS CRAFT

WITH A FOREWORD BY

FIELD-MARSHAL SIR CLAUD W JACOB

G C B C C S I

FORMERLY CONSTABLE OF H M TOWER OF LONDON

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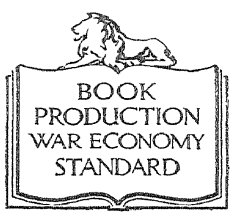

THIS BOOK IS PRODUCED IN
COMPLETE CONFORMITY WITH THE
AUTHORIZED ECONOMY STANDARDS

Composed in Baskerville type and printed by
the Pitman Press Bath
Made in Great Britain

FOREWORD

THIS is a book I recommend to all who serve their country in the Navy, Army, and Air Force. It is a curious fact that very few take any real interest in the history of the arms and armament used in the British Army from very early times till the present day. They expect to be provided with the best weapons, but have little or no knowledge of the history and trial of these weapons. The reader will find some little-known facts in this book, and will notice that the manufacture of our own weapons was not encouraged until a war was forced upon us, when the troops were handicapped by not having arms and armament as good as those of the enemy.

The subject of the rifle has always interested me, for my great-uncle, General John Jacob, C.B., was a real Master of Arms. He had the opportunity and the time, while in command of the Upper Sind Frontier, to make many trials with a rifle he invented. After many experiments he had manufactured to his specifications a double-barrelled rifle known to this day as "Jacob's Rifle." It was a muzzle-loader sighted up to two thousand yards—and this was nearly a hundred years ago. It was such an accurate rifle that at the time there was nothing like it in the world. The authorities, while acknowledging this, expressed the view that the troops in India should not be armed with a better weapon than the troops at home. The author records the strange fact that up till 1820 we imported thousands of muskets from Germany, and that for over three hundred years our swords and bayonets also came from Germany.

It may be remembered that there were complaints from our own men in the first Egyptian War that their weapons crumpled up when used offensively. It then came out in the course of inquiries that these had been imported from Solingen, in Germany.

When I was in command of the left half of the bridgehead at Cologne in 1918–19 I had to inspect the German factories, and found that they had sent their sword and bayonet factories with their machinery far back into unoccupied Germany.

A great deal could be said on this subject of arms and armament, but the reader will find that the author has compressed a great deal of research into a readable volume, which he very properly ends with the warning which so often has been sounded: If we desire peace we *must* prepare for war.

CLAUD W. JACOB
Field-Marshal

PREFACE

THE several sections of this volume are intended to show, though necessarily briefly, the development of certain weapons and equipment of the British Army from the early days of its formation up to the date when the mechanical details are so complex that they can only be studied in highly technical works of reference. They are not intended to be in the nature of a complete history of each weapon or class of objects, but rather to record entries, having some historical interest, from documents and privately printed works which are not accessible to the ordinary student. The large proportion of these notes is reprinted from the *Journal of the Society for Army Historical Research*, and much interesting and valuable information has been gathered from the *Journal of the Royal United Service Institution*, the *Cavalry Journal*, and other publications issued by Service Institutions. These volumes are, as a rule, accessible only to subscribing members, and cannot be consulted by civilian students without special permission. Even for members certain difficulties are experienced in consulting early volumes, for the compiling of a subject index up to date from the early years of the nineteenth century involves an appreciable amount of secretarial work. Much information to be found in these volumes is of great importance in the history of the Navy and Army, but has not been available to the ordinary man, who is forced to deal with the British Museum or our large provincial libraries, or to consult encyclopædias of varying degrees of erudition.

During the last hundred years innumerable volumes and articles in antiquarian journals have been written on the arms and armour of the eleventh to the eighteenth century and on the evolution of the rifle and pistol as weapons of war; but few, if any, of the writers seem to have had any interest in the reasons why military operations brought about change of form and design of weapons, and none has dealt with the equally important subject of the making of these weapons, when all of them were produced by skilled craftsmen as true specimens of handicraft before the days of mass production. The writers on early weapons wrote to a large extent from what may be termed the museum, or collector's, point of view. They expatiated on the lines and main features of a specimen, with much stress laid upon the beauty of decoration, possibly, from the collector's point of view, with an eye to future auction prices. The writer on firearms very properly delved deeply into the mechanical value of the wheel-lock and bolt action, twists of rifling, and other technical details. Both of these classes of writer have recorded the names of the craftsmen who produced these specimens, and in some—all too few—cases, as, for example, in Spain and Germany, have compiled from government and municipal records some details of the lives of these armourers, swordsmiths, and gun-makers. But none of these writers, many of whom bear great reputations as antiquaries or archæologists, seems to have taken the slightest interest in the workshops, tools, and methods used in the production of these masterpieces. No one has suggested how the Bronze Age sword was fashioned, how thousands of steel helmets were forged without a join from ingots of iron, how the American backwoodsmen of the War of Independence rifled their smooth-bore shot-guns, nor how the very complicated fabric of chain-mail was produced in very large quantities

It would have been comparatively easy for pre-eminent writers on armour of the early nineteenth century to have consulted skilled metalworkers who still worked with the hand alone, and to have recorded their methods. The same may be said of the writers on firearms

who write of Cominazzo, Nock, Forsyth, Whitworth, and Metford, to name but a few of these pioneers; but except for highly technical articles they have given us no simple explanation of their processes. All these operations, except that for interlaced mail, could be studied in some measure to-day, for there are still highly skilled metalworkers, sword-smiths, and gunsmiths who can show how these masterpieces of former years were produced, taking into consideration the lack of modern machinery and tools in the early periods. But the making of mail is so entirely different from any branch of metalworking that it is almost impossible to theorize on the methods employed during four hundred years or more.

Here the sin of omission lies heavily, in this country at any rate, on the reputations of the writers on armour who flourished in the first half of the nineteenth century, when chain armour was still used in battle by Oriental nations, for in those days there must have been skilled mail-makers in Lahore or elsewhere in the Punjab, not to mention Persia. And so, although there still survives in public and private collections to-day a large amount of mail of all periods, no writer has taken the trouble to discover the process of manufacture, which must have been in the hands of hundreds—possibly thousands—of semi-skilled workers in the days when every soldier of rank in all the armies of Europe was mail-clad. Paradoxically, mail is such a simple yet complicated defence that one would have expected some of these writers to endeavour to trace the tools and operations before the march of the machine and civilization overwhelmed the craftsman.

In consulting any such works care should be taken to verify references and footnotes, which, however, in works published before the advent of the typewriter can generally be relied on, if the author holds a high repute as an antiquarian, for he dealt direct with the compositor, and any mistake could be laid directly to his charge. But the advent of the typist has added another wheel to the literary machine, and the author has to be certain that the typist has copied his script exactly, in addition to seeing that the typescript and the printer's proof agree.

The reason is probably that in the early days men had more time and could verify their references at leisure, while to-day, with the doubtful advantages of telephone, dictaphone, and wireless, life is more hurried and regrettably more complicated.

Some authors are meticulously exact, as, for example, Hewitt in his *Ancient Armour* or Sir Sibbald Scott in his *The British Army*, and these may be trusted implicitly; but even here there are difficulties, for they may give some reference number in the Public Record Office or the British Museum which has been changed, or they may refer to a published work which is out of print and well-nigh unobtainable When most of the notes in this volume were first printed great care was taken to verify each reference, but as at the present time all historical documents have been removed to the country for safety, it has been found impossible to make a subsequent check.

There is one dangerous type of author—the type who quotes incidents which appear to have some historical value without giving any reference to the source from which he drew his information. In course of time other authors will arise who quote him, and so the possible error is perpetuated. As I have pointed out, the writers of the early and middle nineteenth century can in most cases be relied upon, but it is the popular works which spread unsatisfactory glamour over an incident or conversation which possibly never existed—as witness the many sayings attributed to Queen Elizabeth, Charles I, Charles II, and the Duke of Wellington, to say nothing of Cambronne and Gambetta in France. Such works should be treated with caution.

And so, after these somewhat hypercritical comments, these notes are put before the student of a subject or subjects which have regrettably never achieved great popularity in this country; for in times of peace we are avowedly pacifist till war threatens, but then we can compare, in true democratic militarism, more than favourably with any other nation in the civilized world.

Other nations stress the glories of their military and naval history, but we accept them rather as a matter of course and take little notice of the bowman of Crécy, the Light Brigade at Balaclava, or the gunners of "L" Battery at Néry. But although the man-power of Britain is still incomparable in quality, it cannot avail without the weapons. And it is these weapons and their early history which are described in these pages.

I desire to express my thanks and indebtedness to the Under-Secretaries of State for War, to the Chief Officer of the Ordnance Department, U.S. Army, to the Librarian, H.M. Library, Windsor Castle; to the Directors of the British Museum, of the Imperial War Museum, and of the National Portrait Gallery; to the secretaries of the Royal United Service Institution and the Royal Artillery Institution; to the Council of the Society for Army Historical Research, for the loan of a number of half-tone and line blocks, to Major F. Y. Longstaff and to the Associated Press and Sport and General Companies, for leave to reproduce illustrations. My acknowledgments are also due to Lord Cottesloe, Colonel F. F. Reed, the United States Embassy, the Cambridge University Press, Mr Leslie R. Bradley, of the Imperial War Museum, Mr A. S. White, of the War Office Library, Mr J. Wilkinson Latham, of the Wilkinson Sword Company, Mr W. D. Urwick, of the Petroleum Warfare Board, for valuable advice and assistance.

CHARLES FFOULKES

LONDON
1943

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ILLUSTRATIONS

NOTE

Unless otherwise stated the illustrations are published by courtesy of the Council of the Army Historical Research, from drawings by the author.

CHAPTER I

ARMOUR AND WEAPONS

For over half a million years man has been a combative animal Primarily he fought solely for self-preservation, and as the years rolled by for achieving power and superiority over his weaker neighbours.

At first he relied on physical strength alone, but as his intelligence developed he endeavoured to arm himself with weapons superior to his enemy, and at a later date added skill in trading and political aptitude to achieve his purpose.

Primeval man was principally concerned with the provision of food, shelter, and the jealous protection of the woman who was to bear children to succeed him and, as the years followed, to help him in his daily fight against Nature.

All these things, however, may be profitably studied in works on anthropology, history,

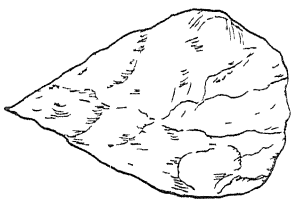


Fig 1 Neolithic Flint

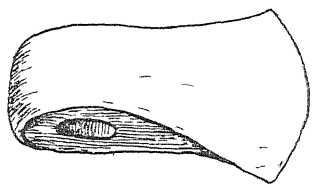


Fig 2 Polished Celt

and politics, which are entirely outside the subject before us—the tracing of the evolution and development of arms and military equipment from the earliest times up to the present day.

The first 'humanoid,' as the scientists call him, fought like his immediate ancestor, the anthropoid ape, the great gorilla, with teeth and hands or claws. Then, by what we call instinct or, perhaps, by the first glimmer of intelligence, he discovered that by using the log of a tree he could injure his opponent without damaging his own hands.

As has happened throughout the centuries right up to our own times the enemy copied this crude weapon. This development called for a further effort of brain power to suggest that with a long sapling he could attack and yet keep his opponent at a distance. And so as the years progressed the log of wood became the club, the mace, and eventually, with shorter handle and with sharpened edge, the sword, while the sapling is, with but little alteration, the military weapon of to-day known as the lance.

This daily, hourly, contact with wild animals and with marauding neighbours went on, and at the same time man's powers of invention were being gradually developed. The crude club was made more effective by attaching to it a rough stone head, and the sapling was probably improved by hardening the point in the newly discovered fire.

This period, known as the Palæolithic period, was followed by the Neolithic period, about 10,000 B.C., when men had learned to chip flints to a sharp edge and to haft them to a wooden stick with sinews in a manner which the most skilled sailor of to-day could not surpass.

As we shall see in a later chapter, these chipped flints continued to be part of the soldier's equipment as late as the first half of the nineteenth century.

Among the relics of the Neolithic Age large quantities of arrow-heads are often found

which show that man had developed the mechanical side of his intelligence (Figs. 1 and 2). Here we have the first long-distance weapon with which a man could attack and remain himself in comparative immunity, and from the early bow we come by successive changes to the modern rifle.

All this time man had not neglected methods of defence. At first, he probably covered himself with animal skins, but in due course he evolved a movable shield of skin mounted on a wicker frame.

The next period in the history of weapons is the Bronze Age period, approximately 4000 years before the Christian era. We can only assume that primitive man, lighting a fire on a rock, found a strange substance exuding which hardened as it cooled. But this substance—copper—was too soft for fashioning weapons, though it was much employed for making decorative articles such as brooches, rings, and the like. The same man, or his brother, had a similar experience when burning a rock of different formation, with the resulting issue of tin. And then, by a stroke of what can only be called genius, the craftsman amalgamated both the tin and the copper, thereby producing bronze, a composite metal so hard that it would take an edge as sharp as a modern razor.

FIG. 3. BRONZE AGE SWORD

This brings us to the real beginning of the manufacture of weapons of war, for those bronze swords, axes, lances, and arrow-heads are as skilfully made as any objects of the same material in present-day use (Fig. 3).

By this time—indeed, as early as the Neolithic period—the craftsman had come into being, for the fighting man and hunter, having no time to give to the production of his weapons and utensils, had to depute others to make them.

It should be remembered that all this evolution and development of fighting weapons was spread over a period of many thousand years of which we know but little. The bronze weapons which have been found in tombs or in burial barrows are of the later era, and these show that the armourer had perfected his methods, for in many of the surviving examples he produced superb specimens. Swords, with edges as keen as any produced at the present day, were inlaid with gold and hilted with wood or ivory, which proves that besides being a swordsmith the maker was a goldsmith of a very high order. And then, by approximately the second millennium before Christ, this craftsmanship reached its zenith. In the next period, about 1000 B.C., iron was discovered—or, at any rate, was found in sufficient quantities to justify its employment for military purposes.

The armourer had now, in some respects, an easier and simpler problem to deal with. There was no necessity to experiment in the complicated system of annealing his copper and tin, and he had only to extract the iron from the rock strata and use fire and hammer to produce the weapons he required.

The expert of the Bronze Age had then to readjust his activities; he turned from weapons of war to expend his energies on articles of personal adornment, and to lay the foundations of the craft of the goldsmith and jeweller.

As his ancestors of the early Bronze Age had to spend, possibly, hundreds of years in experiment, so the iron- or black-smith had to start almost *de novo* and learn the mysteries of tempering or hardening his metal in oil or water; for without this treatment iron is soft and quite unsuitable for the making of weapons upon which a man's life depended.

He had also to study such problems as weight, balance, and that most important detail in the making of armour, the 'glancing surface.' Now, iron—or, in its tempered form, steel—as opposed to bronze, is far more susceptible to weather than any other metal. Indeed, even wood will survive long after iron has rusted and disintegrated. As a result, few examples of armour and weapons of the Iron Age have survived as compared with those of the Bronze Age. Those that have been preserved are of a later period, when the armourer had begun to produce results, fairly satisfactory, but in no way comparable to those of his Bronze Age ancestor. With regard to defensive armour, the iron could only be employed in small pieces, and it required centuries of experiment to produce the splendid examples of craftsmanship of the sixteenth century. Padded leather was used for the body armour, with small plates of iron attached over the more vulnerable parts of the body by laces or rivets. The headpiece, at a later date fashioned with the greatest skill from one plate, was earlier made of several sections riveted to horizontal and vertical bands, and the shield, still of wood or leather, was reinforced by metal plates, rings, and bosses (Fig. 12). Where the armourer failed signally was in the study of balance in respect of the sword, and it is remarkable to find that after many hundreds of years of experiment the swordsmith has failed also, in that he has never produced a sword which is equally perfect for the cut and for the thrust All the swords from the ninth to the thirteenth century are heavy, ill-balanced, and are furnished with a short and unpractical grip (Figs. 4, 5).

FIG. 4 ARMOUR, ELEVENTH CENTURY
From the Bayeux Tapestry

About the twelfth century we find existing an intricate fabric known as 'mail.' This was formed of iron-like rings interlaced, so that the weight of the defensive armour was considerably less than that of the solid breastplate and body armours. This mail continued in general use up to the end of the sixteenth century; indeed, up to the end of the nineteenth century mail was still to be found on the shoulders of the uniform of cavalry regiments.[1] With all our skill of metal-craft to-day no one has been able finally to decide how this fabric was produced. In most examples the two ends of the metal ring

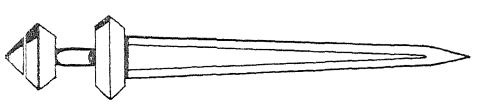


FIG. 5 SWORD, TENTH AND ELEVENTH CENTURIES

[1] In 1878 General Sir George Luck, while serving in the 15th Hussars, had chain-mail sleeves sewn inside the shoulders of his tunic as a protection against the Afghan swordsmen When he became Inspector-General of Cavalry in 1887 he introduced mail shoulder-straps for cavalry in the British Army These chains, which only appear in the Dress Regulations of 1900, are described as of 319 links 'faced' together, of hard steel wire 065 inch in diameter, and are ordered to be worn by officers of cavalry and Royal Horse Artillery.

were flattened and drilled and joined by minute rivets after the separate rings had been interlaced (Fig. 6). Every writer on arms and armour has sedulously avoided any theory as to how mail could have been produced by unskilled workers; for such a large amount of this fabric has survived that there must have been very great stores of mail in this country and in Europe; a fact which suggests that there was some sort of factory organization where the work was done by unskilled, or at any rate by semi-skilled, hands with simple tools. Some specimens of very fine rings have the ends of the ring welded after they had been interlaced, and even highly skilled metal workers to-day cannot suggest the process by which each tiny ring was brought to red heat and hammered and welded.

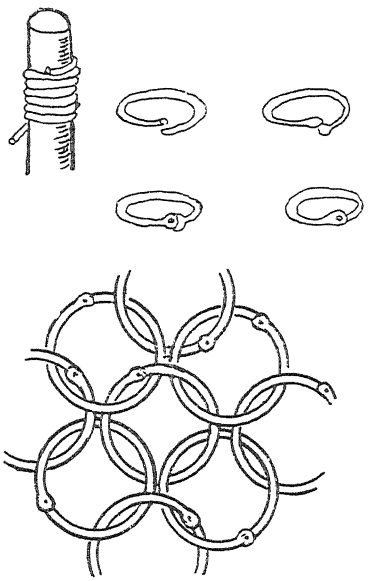


Fig. 6 Chain-mail

The whole subject might have been clarified in the first half of the nineteenth century when mail was still being made in the East, but no one took the trouble to make the investigation. The late Colonel Lawrence scoured Syria but could find no craftsmen, and was told that if mail needed repair it was done by steel split key-rings made in Birmingham.

This mail must have been in general use in the East during the early years of the Christian era, for the Parthians are shown weaving such a fabric on the Trajan Column in Rome, which may be dated about A.D. 114, the Romans themselves being shown as armed with helmet and short cuirass of plate. The use of mail, however, gradually spread throughout Europe, and by the thirteenth century it was in general use by the mounted knight. Now, mail could not be worn alone as a defence, for a heavy blow would drive the links into the flesh; therefore very thick, padded garments were worn; but these, together with the weight of the mail, made rapid action with the sword an operation which necessitated considerable strength and effort.

With the thirteenth century we can begin the study of that defensive armour which culminated in the magnificent examples of the fifteenth- and early sixteenth-century plate armour. By the end of that century the fighting man was completely clothed in mail—gloves, sleeves, body and leg armour—and, as the skill of the armourer progressed, reinforcing plates were added. The headpiece of the earlier period was, as has been noted above, of conical form which, possibly by accident, was the first attempt to provide a surface from which the sword or axe would glance. But with his increased skill the armourer endeavoured to exhibit his dexterity in smith-work and to offer to his patron a defence which would entirely protect his head. This flat-topped helm must have often proved to be of negative value, for it was difficult to attach it firmly to the body armour, and the full force of a blow on the head would put the wearer out of action Fig. 7).

Fig. 7 Helm and Mail circa 1240
Bib. Nat. Paris

By the middle of the sixteenth century the craft of the armourer had advanced so considerably and plate armour was so ingeniously contrived that there were but few openings

which could be pierced by the weapons in use at that period. A new weapon, therefore—the great steel mace and war hammer, a direct descendant of the flint axe—was employed to break open the plate armour, but when, later on in the century, armour was discarded piece by piece, this weapon was no longer required. It was not till 1915 that close quarter fighting in the trenches produced something similar in a simple wooden club studded with nails; this in turn, however, disappeared with the end of the war. In 1943 the great iron mace was revived for the long-suffering Home Guard, who were offered the pike and mace till the rifle and bayonet were forthcoming. Neither weapon was popular, and in course of time they were returned to store unused and unregretted (Figs. 8 and 47).

As, however, we are concerned with the equipment of the British Army, we must leave this study of mediæval armour and suggest to the reader who requires further information that he should consult the works given in the bibliography at the end of this volume. The only plate armour which survived, and for a short period was used in the Army, was the pikeman's (Fig. 17) and cavalryman's breastplate—abolished in the later years of the seventeenth century—and the helmet worn by horse and foot during the same period.

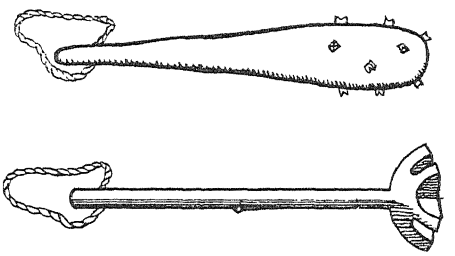
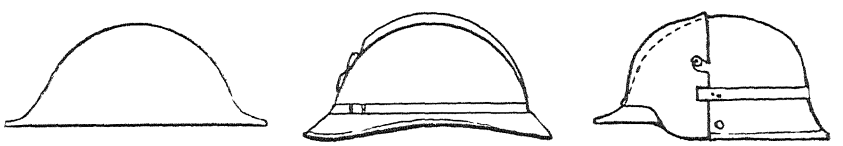


FIG. 8 CLUBS, 1915 AND 1940

The cuirass and helmet of the Household Cavalry and the helmet of the dragoons were only adopted in 1821; they were never used in war, being kept solely for ceremonial. In 1915 the system of trench warfare was responsible for the steel helmet as a defence against shrapnel, based on the *chapel de fer* of the late fifteenth century. The British was simple to turn out by mass production, and provided the true 'glancing surface.' The French helmet, though attractive in design, was thin and penetrable, while the German pattern was heavy and would splinter, where the British helmet was only dented.[1]

The sword continued to be a straight two-edged weapon with merely a cross-hilted



British *French* *German*

FIG. 9 HELMETS, 1914–18

guard. Such a guard was of little value as a protection, and the fighting man relied entirely on his gauntlets of mail or plate to defend his hands.

At the close of the sixteenth century, when military operations were being extended, greater freedom of movement was needed, and the suit of plate armour was gradually discarded, including the gauntlet; it therefore became necessary to protect the hand with an elaborate arrangement of guards, counterguards, and rings embodied with the cross-hilt to form a more or less practical hand-guard (Fig 23). The sword was now lighter and was used, in the longer examples, for thrusting, and in the shorter weapons for cutting only. The main types of swords were the rapier and the cutlass.

[1] Bashford Dean, *Helmets and Body Armor in Modern Warfare* (1920)

By the end of the seventeenth century the rapier was abolished in the army, merely surviving in a decorated form used for Court and ceremonial purposes.

The cutting sword was still carried by cavalry, and in reduced form by the infantry, who discarded it on the introduction of the bayonet. The lance was the weapon adopted by the mounted man; it endured from the fourteenth to the middle of the seventeenth century, at which date, in a lighter and much elongated form, it became the weapon of the dragoon. The military man and his armourer have for centuries, even up to the present day, attempted to devise a two-purpose weapon and endeavoured to make the short sword for the foot soldier more useful by adding an axe-head, from which was developed the halberd. Every civilized army used large numbers of these weapons, but after a period of experiment found that they were inconvenient and caught up with each other in close action. Indeed, the Swiss found them such a hindrance that they discarded them after the battle of Arbedo as early as 1422.[1] By the end of the eighteenth century the halberd ceased to be a weapon of war, and has been carried right up to our own time only by ceremonial guards [illegible].

The simple lance, however, is still one of the important arms of the British Army, in many respects more important than the sword—and as such will be considered in another chapter.

All these close-quarter weapons were evolved from the club and sapling of primitive man, all being changed, altered, and developed out of all recognition as the centuries went on. Alongside of them the bow persisted without the slightest alteration in its construction, it lasted for thousands of years as a weapon of outstanding value right up to the seventeenth century, when it was superseded by the firearm. Indeed, for many years after the introduction of fire the bowman was still far more efficient than the musketeer, as will be shown in the chapter devoted to firearms.

And now, when all too briefly the gradual transition of arms and equipment from primeval times has been traced, it may be permitted to offer some criticisms on the designs adopted for providing adequate weapons and defences for the fighting man who was individually responsible for victory or the reverse. It seems hardly credible that the obvious defects of weapon or armour were ignored for long periods, and that down to our own time men were sent to fight in uniforms which to-day we only see on the comedy opera stage. Even great military leaders like Sir John Smythe[2] and Count Maurice de Saxe[3] had their suggestions relegated to printed books and never put into practice. The average military historian for the most part avoids any destructive criticism, and does not dwell upon what the outcome of a battle or a war might have been if troops had been equipped in a more practical manner.

We will, then, go through the important varieties of arms and armour in the endeavour to show how the designers and makers seem to have worked rather to show their skill in craftsmanship than in the production of practical military weapons, and how high military officers preferred the splendour of their troops on parade rather than their efficiency on the battlefield.[4]

The illustration in Fig. 4, from the Bayeux Tapestry, shows the knight at the battle of Hastings, or Senlac. His helm is certainly most practical, for its pointed shape is the first attempt to provide that 'glancing surface' which is such a feature of later plate-armour,

[1] Johannes von Muller, *Histoire de la Confederation Suisse*, vol. iv, chapter vi, p. 543.
[2] *Instructions, Observations, and Orders Militare* (1594).
[3] *Les Rêveries sur l'Art de Guerre* (1756).
[4] Extracts from a paper read by the author to the British Association, August 1938.

and the nasal is a fair defence to nose and eyes against a cut. The shield appears to be almost entirely useless, for it is of such a size that it could only be used to protect the left side and could not be moved rapidly across the horse's neck and high arçon of the saddle.

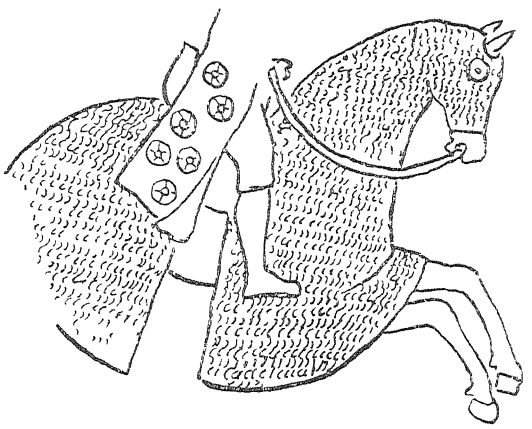


Fig. 10. Horse Trapper of Mail. Late Thirteenth Century
Hewitt's *Ancient Armour and Weapons*

Fig. 11. Horse Trapper of Fabric. Fourteenth Century
Brit. Mus. Roy. MS. 16 G. VI.

The body, arms, and thighs are protected either by quilted linen, leather with plates or rings superimposed, or with actual mail. It is impossible to tell from the tapestry which fabric is intended; possibly the mail, an expensive fabric, was only worn by the leaders. Whatever the make of the defence might have been, it must have been heavy and cumbersome, restricting free movement, specially if the wearer were dismounted. The favoured weapons were the lance and the long sword. This had a simple cross-hilt of little or no use as a guard; it was so badly balanced that quick recovery and defence were impossible, and if it had a point it was so obtuse that no attempt could have been made to use the thrust.

The horse was, in the case of men of rank, defended by housings of mail, but this must have been extremely heavy and very costly to produce (Fig. 10). The most favoured defence was the trapper of fabric reaching to the hocks. Both were quite serviceable protections, but from their very nature serious impediments to rapid movement (Fig. 11).

During the fourteenth century the production and working of metal progressed, but the armourer had not yet developed the skill which was so marked in the productions of his descendants in the fifteenth and sixteenth centuries. He therefore superimposed small plates of iron on the mail. These were often attached with laces, which it is obvious could be cut off in action, leaving the wearer hampered and possibly defenceless. The body, still covered with mail, or reinforced perhaps by a crude breastplate, was covered by two other garments (Fig. 12). In an ordinance of Louis XI we find that linen coats as the defence of the foot-soldiers, were to be of thirty thicknesses, with possibly a deerskin on top; surely not conducive to rapid movement.

The flat-top helm gave place to the more practical ovoid bascinet; weapons, however, remained much the same, except that the great sword now had a sharp point, although it could hardly have been used for the thrust.

With the fifteenth century we have the complete suit of plate articulated at knee and elbow, the unarmed parts at neck and armpits being protected by gussets of mail—perhaps the best-designed armour ever made, defensive as far as was possible, and convenient in use (Fig 13) This was probably the most practical period as regards armour and weapons The bow became the favoured weapon, and with its outstanding moral effect won the victories of Crecy and Poitiers for the English Both armour and weapons were simple

FIG 12 ARMOUR 1327
Brass at Stoke d Abe non S rey

FIC 13 ARMOUR CIRCA 1400
B ass at Laughton L nes

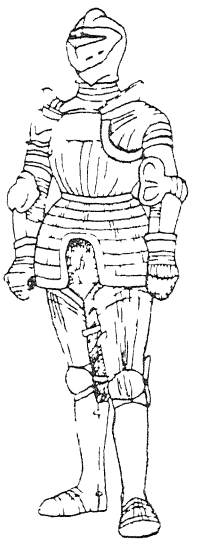
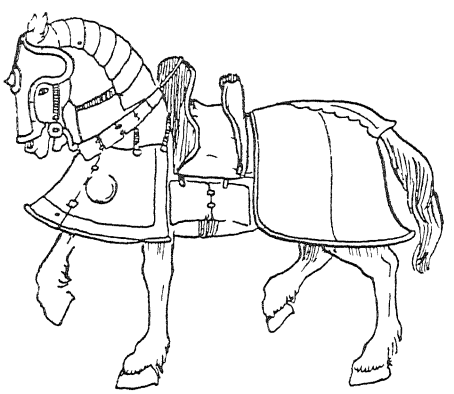
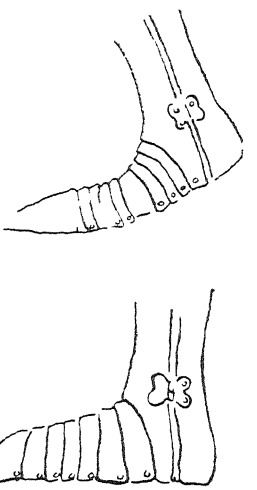


FIG 14 FLUTED ARMOUR EARLY SIXTEENTH CENTURY



FIC 15 HORSE ARMOUR, EARLY SIXTEENTH CENTURY



FIC 16 ELBOW SHOULDER AND LEG ARMOUR FIFTEENTH CENTURY

Pl 17 Pikeman's Half Armour 1607 60

Musketeer 1607

Jacob de Gheyn *Exercise of Arms*

d convenient in use. And now the armourer, having learnt the rudiments of his craft, oduced extravagancies which entirely destroyed essential qualities.
Elbow defences were so wide that they hampered the movement of the arms, shoulder-ces overlapped at the back in such a way that they prevented rapid action, and foot nour became so extravagant that walking was an impossibility (Fig. 16)
In the latter part of the sixteenth century there was some attempt to recognize scientific nciples. The 'glancing surface' was carefully studied, and the whole suit was fluted order to give increased rigidity without undue weight, as exemplified at the present day in corrugated iron (Fig 14) This was in many respects excellent for defensive purposes when shock tactics of very heavily armed men and horses were the order of the day But there was one serious error in the fixing of the close helmet, which had at its base a hollow rim which fitted closely on to a similar rim on the gorget. Thus the wearer could not possibly turn his head, and if he fell from his horse there was every chance of his breaking his neck. The horse was heavily armed on head, neck, chest, and crupper, but a well-directed cut on his leg would bring down man and horse with no chance of recovery (Fig 17).

Fig. 19 Grenadier 1745
From an engraving by Bernard Lens

With the advent of firearms defensive armour became thick and heavier, for the best examples were always proof against musket or pistol shot During the previous hundred years weapons had altered considerably. The sword had become lighter and more convenient to use, but such composite weapons as the halberd (spear and axe) and gisarme (spear and sickle) can only have been serious hindrances to men fighting hand to hand. The bow, the weapon par excellence of England, fell into use. although the archer could discharge twelve to fifteen arrows while the musketeer s loading his piece—a lengthy operation during which he had to seek safety under the es of the infantry. These, often eighteen feet long, were most inconvenient to handle by n in close formation, and the breaking of one or two in a determined cavalry charge uld throw the whole of the line into confusion The musket itself weighed eleven to iteen pounds, and the musketeer had to carry, in addition, a forked rest, a string of adoliers, a priming horn, a sword, later on a plug bayonet, a full-skirted coat, and a at broad-brimmed hat. The pikemen who followed the lightly armed infantry of the eenth century were loaded with helmet, breast- and back-plates (pistol proof), tassets, ord, and long pike A contemporary writer states that after a march of fifteen miles thus outred, the soldier is more ready to sleep than to fight (Figs 17, 18).[1]
As has been pointed out, the craftsman invariably improved his tools in order to make m more useful and more convenient to handle, but the military designer seemed to work the opposite direction. By the eighteenth century splendour in parade was aimed at her than the provision of equipment which would make the soldier a better fighting n, indeed, this unnecessary magnificence lasted even to our own times.
The illustration (Fig. 19) shows a grenadier with high hat, musket, sword, and pouches

[1] Edward Davies, *The Art of Warre* (1618).

for ammunition and grenades, and the cavalryman was in no better condition. Light cavalry were encumbered with hatchets and felling axes, while dragoons carried, or at any rate were ordered to carry, halberds. Still the musket remained at 11 lb. in weight, and when the bayonet was fixed the foresight was obscured.

The heavy cavalry had long, ill-balanced swords with hatchet point, only useful for heavy cut and impossible for thrusting. The light cavalry sword, in the hands of the expert,

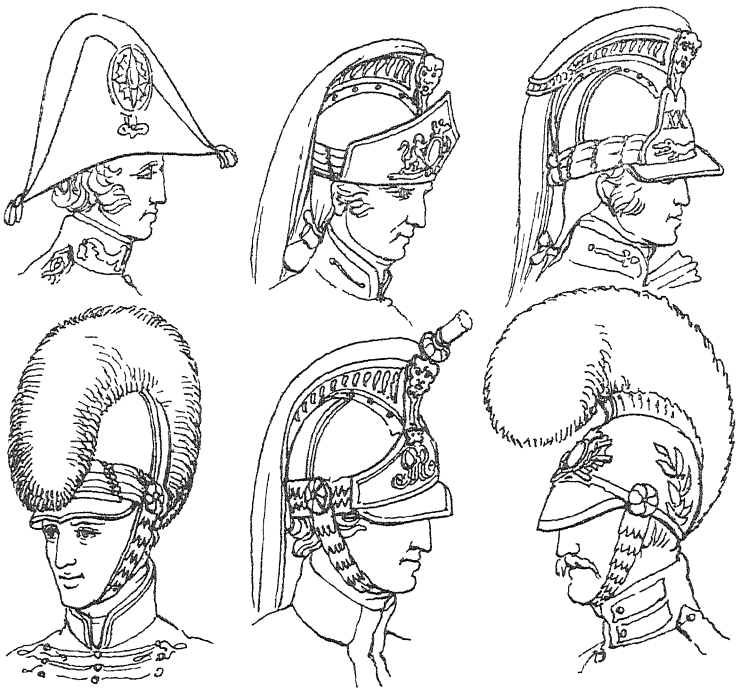


FIG. 20 HEADDRESSES, EARLY NINETEENTH CENTURY

Staff Officer, 1830 22nd Light Dragoons, 1760, 20th Light Dragoons 1790, Light Dragoons, 1800, Heavy Dragoons, 1812, Heavy Dragoons, 1824

Lieutenant-Colonel J. Luard *History of the Dress of the British Soldier*

who was indeed a rarity, was as fine a cutting weapon as could be devised, but here again it could not be used for thrusting.

During all this period the German models, devised by Frederick the Great to increase the splendour of his troops, were imitated by our Hanoverian kings, and great headdresses (Fig. 20), helmets, and cocked hats made effective show on field days, but were entirely unsuitable for long campaigns over rough country in bad weather. Possibly the designers attempted to revive the Greek tradition of overawing the enemy by their extravagant equipment, but certainly no man who had endured the campaigns of Marlborough and Wellington could have had a hand in evolving such designs.

With the nineteenth century some slight improvements were made, especially in the coats and tunics, but the designs of headdresses followed Germany, and the shako overspread Europe. The hussar was cumbered with the slung pelisse and sabretache, while the Household Cavalry were decked in helmets and breastplates; but no attempt was made to produce a service dress even for troops serving in tropical countries. It was not

till the latter half of the nineteenth century that anyone tried to comply with those two essential rules of all good craftsmanship—suitability and convenience.

And now we may inquire whether these elaborate appurtenances were worn in actual warfare; but in doing so we must remember how and for whom the pictorial records that have survived were produced. The early illuminations, such as the great *Chronique d'Angleterre* and the Pierpont Morgan *Old Testament*, were probably produced by cloistered monks or local artists for the glorification of some great patron in order to record his victories

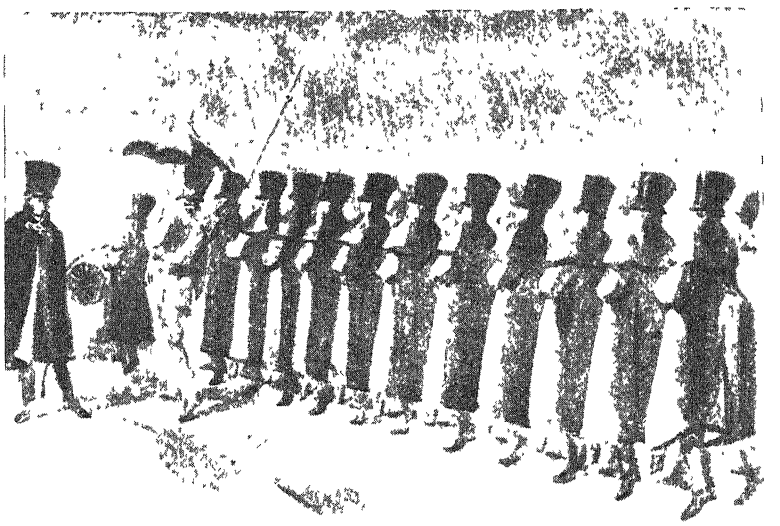


FIG 21. TROOPS ON THE MARCH. 1825
By courtesy of the British Museum

and triumphs. Dürer occasionally leaned to realism, but the painters of battlepieces all set out to glorify war conditions which they had never seen.

Then came the producers of lithographs which are often used to illustrate regimental histories, and still carry on the tradition of the splendour of war; their publishers have their eyes on the regimental officer, or on a public used only to parades and sham fights.

In the early pictures all, even the humble men-at-arms, are in polished armour with brilliantly coloured garments, in spite of the fact that they had marched and fought in mud—and, indeed, at Crécy, in a downpour of rain. The same may be said of the armies of Marlborough and Wellington. In the Spanish campaign of 1712 Colonel St Pierre writes[1] that the clothing sent out to him was so much damaged and eaten by rats as to be useless, and his men are almost naked. One of Wellington's officers writes that, provided his men had sixty rounds of ammunition, Wellington did not care what the army wore, grey, blue, brown, or red.[2] In the Mutiny stocks and coat-tails were cut off for easier movement, and in the Crimea General Lefroy wrote that the army was almost barefoot.

But such lapses from Dress Regulations were considered indecent by military artists; indeed, their portrayal would have aroused a storm of protest from the public and in Parliament. Occasionally we find in unpublished sketches glimpses of a revolt against

[1] Charles ffoulkes, *Sword, Lance, and Bayonet*, p 45.
[2] William Grattan, *Adventures of the Connaught Rangers*, p 50

regulations—as, for example, the sketch by George Scharf of troops on the march in the rain, headed by an officer carrying an umbrella, but these records of true facts are very rare (Fig 21). Goya made some attempt to portray war as it was, and later Vereshchagin stressed the horror and tragedy of war, but Meissonier and de Neuville both clung to the convention of (modified) 'spit and polish.' It was only when the Press became a recognized factor in military operations that those great journalists, Melton Prior and Caton Wood-

FIG 22 UNIFORM AND EQUIPMENT, 1915–18
Crown copyright, Imperial War Museum

ville, showed how men appeared in action. With the war of 1914–18 the stark realism of the photograph recorded facts, and the vast collection in the Imperial War Museum (Fig. 22) shows men in the trenches and in the field so fantastically equipped that it is impossible to realize that the wearer of goatskin jerkin and mud-caked waders is the same man who, in bearskin and scarlet tunic, relieved guard at St James's Palace.

Let us keep the brilliant equipment of peace-time as long as we can, and as long as we can afford it, for life at the present day is not very picturesque, and we need colour and pageantry and 'fancy dress' as an antidote to depression. If we must have pageants and tattoos I suppose they must be brilliantly costumed, as the public would feel that a rabble army in rags would not give them the entertainment they had paid for, but in serious works let us have true, stark facts, for our descendants should be able to take these as records and not merely studio productions by an artist who had probably never been outside Chelsea or Bloomsbury.

ARMS AND ARMAMENTS OF THE BRITISH ARMY

The dates are given for the most part in round figures to indicate the approximate periods when certain arms and armaments were in use

1066	Mail, fabric defences, pointed helmet, sword, and long-bow
1240	Mail, flat-topped barrel helm
1280	Mail reinforced with plate, 'sugar-loaf' helm
1300.	Further plate reinforcements, visored helmet (bascinet)
1400	Complete plate, finest period of armour. 'Built-up' breech-loading iron artillery.
1500.	Heavy plate armour, lance and mace, muzzle-loading bronze artillery.
1550	Three-quarter armour, open helmet, match-lock musket, wheel-lock cavalry pistol
1600.	Half armour, pike Cartridges introduced
1700.	All armour discarded except cavalry breast-plate Flint-lock musket and cavalry pistol
1800.	All armour abolished Flint-lock rifle, sergeant's spontoon introduced (abolished 1830)
1820	Helmet and cuirass introduced for Household Cavalry (ceremonial)
1829.	Cavalry lance introduced
1839	Flint-lock converted to percussion, cavalry percussion pistol.
1851	Minié rifle.
1855	Enfield rifle.
1866	Enfield rifle converted to Snider breech-loader
1871	Martini-Henry rifle
1879–81	Experiments with machine-guns Breech-loading field artillery introduced.
1883.	Maxim gun
1888	Lee-Metford rifle.
1895	Lee-Enfield rifle
1900.	Pistol ordered for infantry officers
1904	New cavalry sword adopted
1915–16	Lewis gun, Stokes mortar, Mills bomb, and tanks introduced.
1934.	No swords to be worn by infantry officers except for ceremonial

CHAPTER II

THE SWORD

THE evolution of the sword from a club of wood has been traced in the first chapter of this book, the series ending with the rapier and cutlass of the seventeenth century; and it is at this period—to give a precise date, in the year 1661—the British Army came into being, but with little if any difference in the pattern of weapons which had been in use for half a century.

Here a digression is necessary to explain the several parts of the sword, as the technical names will occur in subsequent descriptions of the various types of weapon.

The sword should always be described as it is held in the hand

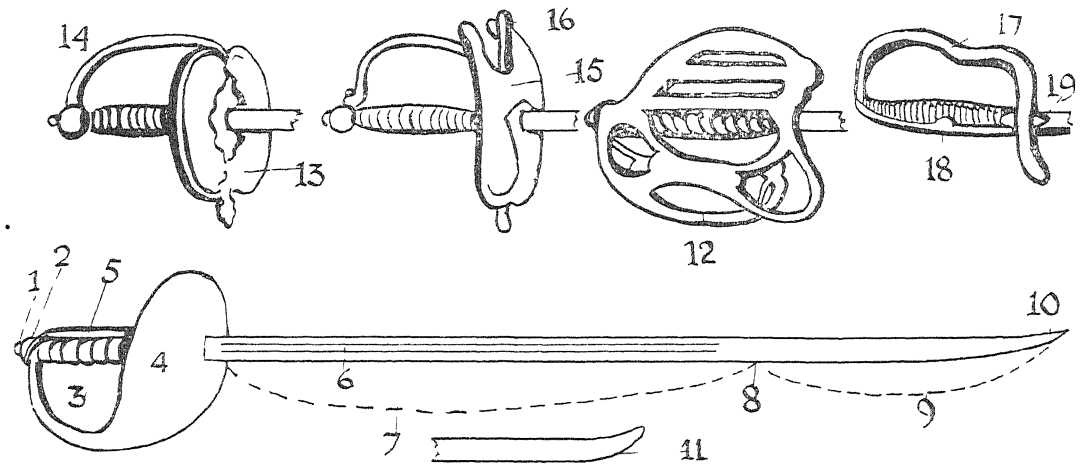


FIG. 23 THE SWORD

1, tang end 2, pommel 3, grip 4, bowl guard, 5, back, 6, fuller, 7, 'fort', 8 point of percussion, 9, 'foible', 10, spear point, 11, hatchet point 12, basket hilt, 13, shell guard 14 knuckle-bow, 15, 'boat' shell 16 quillon 17, stirrup hilt, 18, 'ear', 19, langets

The Hilt

The hilt consists of

(*a*) the **pommel,** or knob, at the lower end of
(*b*) the **grip,** which explains itself as the part held by the hand; surrounding this is
(*c*) the **guard,** which can be either a solid bowl-shape piece or may be formed of one bar, the knuckle-bow, or several bars, all ending in
(*d*) the **quillon,** which in some cases is a straight bar or in others curved. In the centre of the quillon are the
(*e*) **langets,** small 'ears' of metal, which project from the quillon and cover the mouth of the scabbard.

The Blade

The blade is divided into 'fort' and 'foible.' The fort being the point of percussion where the full force of a cut can be delivered, usually marked with a cross-line on the back of

the blade, the foible being the weaker part nearer to the point. The blade is either two-edged or single-edged with a squared back or in some cases a 'pipe' back—that is, rounded so as to give increased rigidity for thrusting, but offering rather a drawback when cutting.

Blades are 'fullered'—that is, grooved—so as to lighten the weight of the sword without lessening its rigidity. The point is either a 'spear' point or a 'hatchet' point, which is only found on heavy swords never used for thrusting. Blades are usually straight, curved, or what is known as 'yataghan'—that is, a slight curve near the hilt swelling outward at the point. The base of the blade is the 'ricasso,' and the tang is the continuation of the blade either piercing through and riveted over the pommel or of flattened form with leather or wooden grip riveted on each side (Fig. 23).

Cut and Thrust Swords

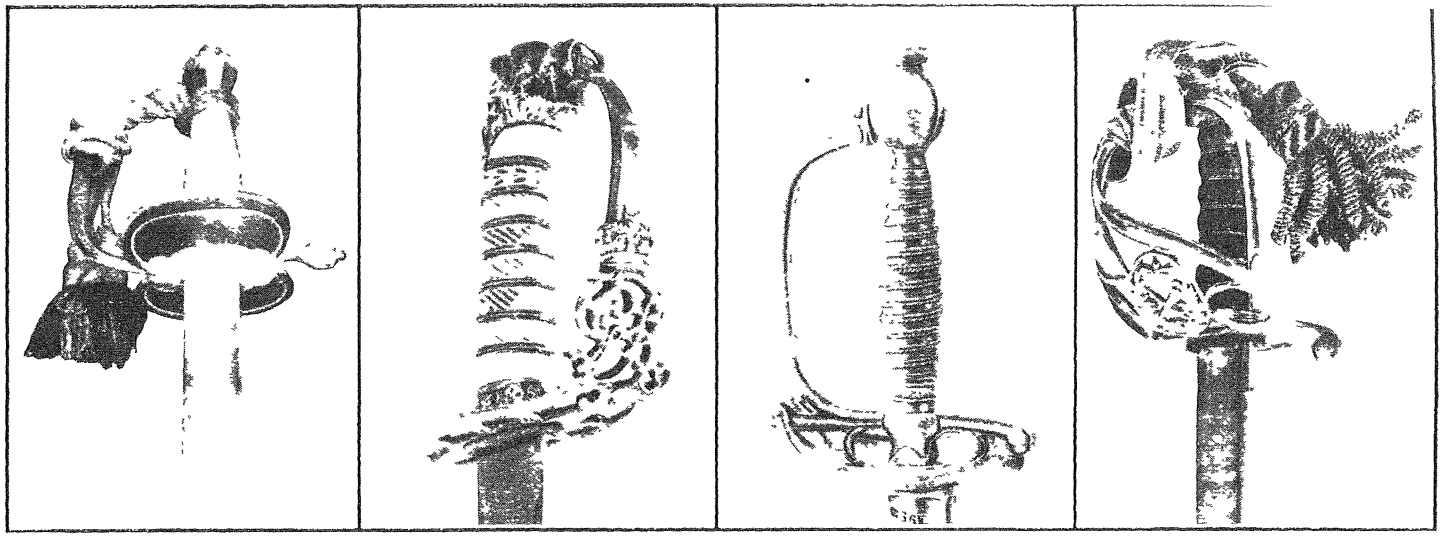
It has been noted in the previous chapter that many of the early types, especially those in vogue from the eleventh to the middle of the sixteenth century, were unpractical, in that, except for the crushing blow, they could not be used as a guard and were useless for the point. This raises the much debated question as to what the true function of the fighting sword should be. One of the earliest military writers on the subject, Count Maurice de Saxe,[1] considered that it was most useful for the thrust, and other later authorities have agreed, for the wound made with the point is more difficult to heal than that made with the cut. Against this must be placed the opinion of that remarkable soldier, General John Jacob, artilleryman, engineer, and cavalryman, who stated that on one occasion he thrust so effectively through shield and body of one of his Indian opponents at the battle of Meanee (February 17, 1843) that he nearly broke his wrist in withdrawing it.[2] This, of course, made it impossible to use the sword as a guard. Those in favour of the cut claimed that a cut with skill and weight behind it would do more than the thrust to put a man out of action, and that it was easy after the cut to recover quickly to come on guard. In later years, when the subject was discussed in the United Service Institution,[3] the general opinion seems to have been that the thrust should be used for the charge, and the cut in the mêlée, for at close quarters it is difficult to use the thrust.

In some respects the thrust is the easier, provided that the hand and thumb are in the proper position, but all have agreed that it requires great skill and practice to cut 'with the edge leading,' otherwise the blow will turn and fall on the flat of the sword. It has been instanced that in the Charge of the Light Brigade at Balaclava only two of the Russian gunners were killed by sword-cuts![4]

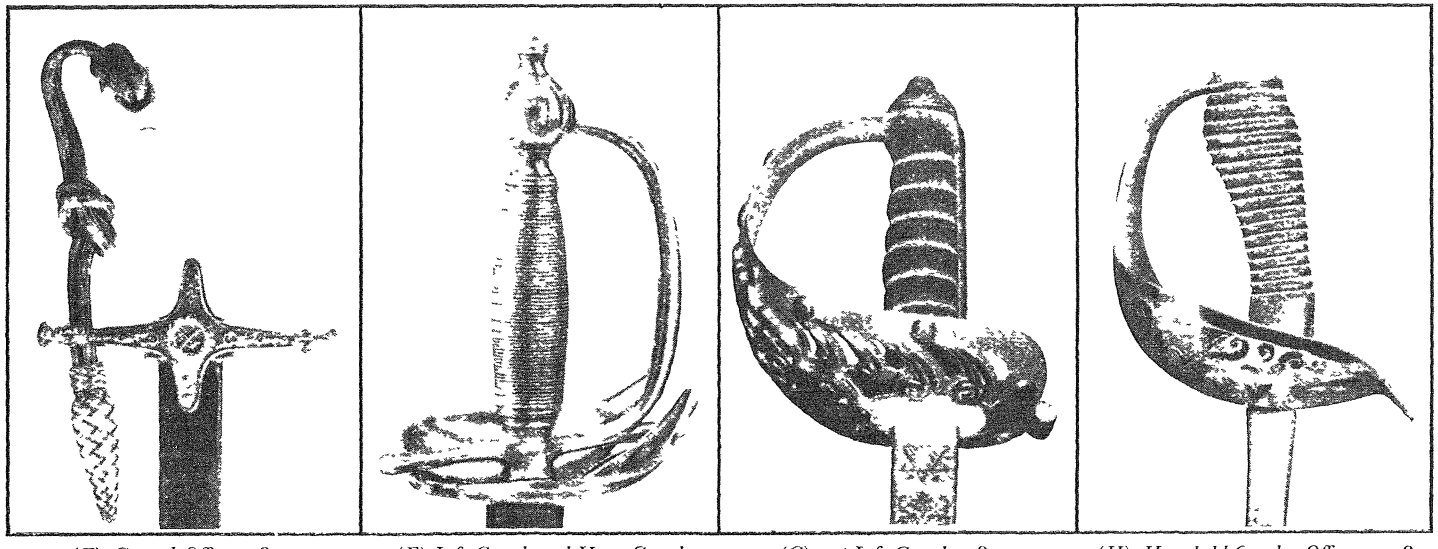
It would appear, therefore, from all this that a really practical cut and thrust sword is a dream that can never be realized. In 1906 a committee formed under Major-General Scobell very rightly decided on the thrusting sword, and in 1908 the cavalry sword produced was the finest sword of this type that has ever been designed

Before the year 1822 we have little beyond vague descriptions to guide us in the study of the regimental swords, and our researches should proceed with caution. The provision of swords for a regiment was largely in the hands of the commanding officer, who chose the patterns and put out the contracts—often to German swordsmith factories, mostly

[1] *Les Rêveries sur l'Art de Guerre* (1756)
[2] Alexander Shand, *Life of General John Jacob* (1900)
[3] *Journal of the Royal United Service Institution*, vols. VI, XXIII.
[4] *Cavalry Journal*, vol I.



(A) *All Officers, Eighteenth Century* (B) *General Officer*, 1803 (C) *General Officer*, 1813 (D) *General Officer*, 1822



(E) *General Officer*, 1831 (F) *Life Guards and Horse Guards* 1822 (G) *1st Life Guards*, 1834 (H) *Household Cavalry Officer*, 1908

FIG. 24 SWORD HILTS

in Solingen. The result of this rather haphazard organization has left for us a large number of varied patterns, especially in the Infantry, and these may possibly have been changed when a new colonel was appointed As there was no regular issue the War Office papers in the Public Record Office teem with entries of swords bad, swords unsatisfactory, or swords altogether missing concerning which no official comment seems to have been made.

The War Office papers of the eighteenth and early nineteenth centuries in the Public Record Office are, for the most part, vague in the descriptions of weapons. Even the first Dress Regulations—dated 1822—for officers give no minute details, nor have they any illustrations. The description of Service swords in the official textbooks are often not very informative, and for these details we are indebted to Mr J. Latham, who served on the War Office Committee on Swords in 1885, and handed on his intimate knowledge to his son, Mr J. Wilkinson Latham, who was largely responsible for the famous Stalingrad sword. Very rarely a sword is marked with a date, and without this guide the student must turn to contemporary dated military prints or portraits. With these caution must be exercised, for the artist often either shirks responsibility by facing his figure to the left with the sword hidden, or he may carelessly show a badly drawn hilt, like nothing that has ever been made or worn.

With portraits of officers whose names and dates are known we are on surer ground, for their rank can be verified in the early Army Lists But here again one has to be careful, for sometimes a general officer may wear the sword of his regiment or he may wear a non-regulation sword. The Duke of Wellington was a notable offender, for he habitually wore a sword known as the 'Mameluke' hilt which was not regularized for general officers till 1831. The subject is apt to be somewhat confusing if taken as a whole and, therefore, it will be simpler to deal with each arm of the service under its respective headings. As it will not be possible within the confines of the present work to go into minute details the student should consult *Sword, Lance, and Bayonet* by the present author.

Differing Types distinguishing Ranks and Regiments

General Officers. In the eighteenth century general officers wore whatever sword took their fancy. It was usually the straight sword with knuckle-bow and two small plates below the grip, known as 'shells' (Fig. 24*A*). With the general may be classed the field-marshal—a title given by George II to John, Duke of Argyll, in 1736—for this was purely an honorary rank and, as such, the bearer was not bound by regulations except those which dealt with generals The first Dress Regulation that mentions the field-marshal was published in 1831.

The earliest Horse Guards Order dealing with general officers is dated March 18, 1803, but no details of the design are given (Fig. 24*B*). It is, however, shown clearly in a drawing by Loutherbourg of General Charles Leigh, who was promoted General in this year.[1] Here is one of the difficult points in studying the sword In the Tower Armouries lies the Sealed Pattern sword of this design, the scabbard of which is covered with crimson velvet. Presumably this was intended for a field-marshal, for the sword of General Sir Thomas Trigge, Governor of Gibraltar, in the author's collection, has a simple leather scabbard

[1] Library, Windsor Castle, No. 16435.

stamped with crowns—possibly an undress or service sword. The next change—about the year 1813[1]—shows a carefully drawn figure of a field-marshal wearing an entirely

FIG 25 FREDERICK AUGUSTUS, DUKE OF YORK, BY SIR DAVID WILKIE
By courtesy of the National Portrait Gallery

different pattern based on the officer's sword of the late eighteenth century (Fig. 24*C*). The general officers are depicted with the same sword. The statue of George III by Wyatt in Cockspur Street shows the same sword, carefully modelled This pattern

[1] E Hull and Englemann, *Costume of the Army of the British Empire* (1829–30).

continued in use till 1822, when a sword-hilt of entirely different pattern to anything that had gone before was introduced The handguard is pierced with tracery very like that found in what is known as Gothic architecture (Fig 24*D*) The Dress Regulations simply record it as 'half-basket," but this vague description might apply to any sword with openwork handguard except the Scottish basket-hilted broadsword

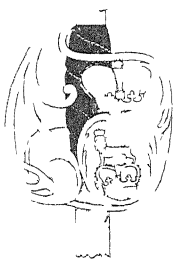


FIG 26 LIFE AND HORSE GUARDS OFFICERS SWORD HILT 1 14

There is an interesting portrait by Sir David Wilkie of Frederick Augustus, Duke of York, in the National Portrait Gallery reading an official document and wearing the 1813 sword, but on the table is an entirely different pattern which appears to be the new Gothic hilt ordered in 1822 (Fig 25) As the painting is dated 1823 it may reasonably be considered that he is reading his own order for the 1822 pattern The Duke of York's sword of this design is exhibited in the Armouries of the Tower (Fig 28) [1] The next pattern is known as the Mameluke hilt, 1831 pattern (Fig 24*E*, from its similarity to Oriental swords As has been noted above the Duke of Wellington carried this sword during his campaigns in Spain and France and it was probable that his non-regulation sword was used as a pattern for the new sword This is the standard pattern to-day for field-marshals and generals, with the distinguishing rank badge at the base of the grip between the quillons

Household Cavalry. *Officers* The Household Cavalry, styled Life or Horse Guards, came into being in 1661, but the patterns of swords varied so much, and there are so few pictorial records, that it would require long descriptions and many illustrations to show how these regiments were armed during the eighteenth century

The earliest authoritative records of officers' swords are the careful drawings by Denis Dighton (1792–1827) preserved in the Royal Library at Windsor Castle Dighton held a commission in the 90th Regiment, and when his drawings were brought to the notice of the Prince of Wales (afterwards George IV) he was made Military Draughtsman to the Prince in 1815 In this record every detail is given minutely, and we can be certain that the uniforms and equipment are absolutely correct He shows the officers of the Life and Horse Guards with an elaborate sword of scrolled bars and a plate bearing the crown and the royal crest (Fig 26) New Dress Regulations were issued by George IV in 1822, and here fresh difficulties are raised owing to the vague nomenclature employed The 1st and 2nd Life Guards had a simple knuckle-bow with boatshells similar to that of the general officers of the same year, and the Horse Guards had the same type of sword for full dress, but for dress and undress the grip was bound with 'yellow wire in the former and silver in the latter (Fig 24*F*) The dress sword of the Life Guards had a half-basket hilt, but no details are given of its design

With the accession of William IV new regulations were laid down in 1834 and here, at any rate for the 1st Life Guards, the design of the hilt is given in detail a steel guard with twelve brass studs in the margin, pierced ornaments and "1 L G" applied in brass, the blade having a 'hatchet and not a spear point (Fig 24*G*)

The sword of the 2nd Life Guards was entirely different, for it had a guard of 'three chased bars, the stool being ornamented on both sides with a grenade " Up to the present it has not been possible to say what the stool' was There is, or was, at one time a sword

[1] The Armouries of the Tower exhibit the swords of George II George III George IV William IV Edward VII and King George V all presented by His Majesty King George VI

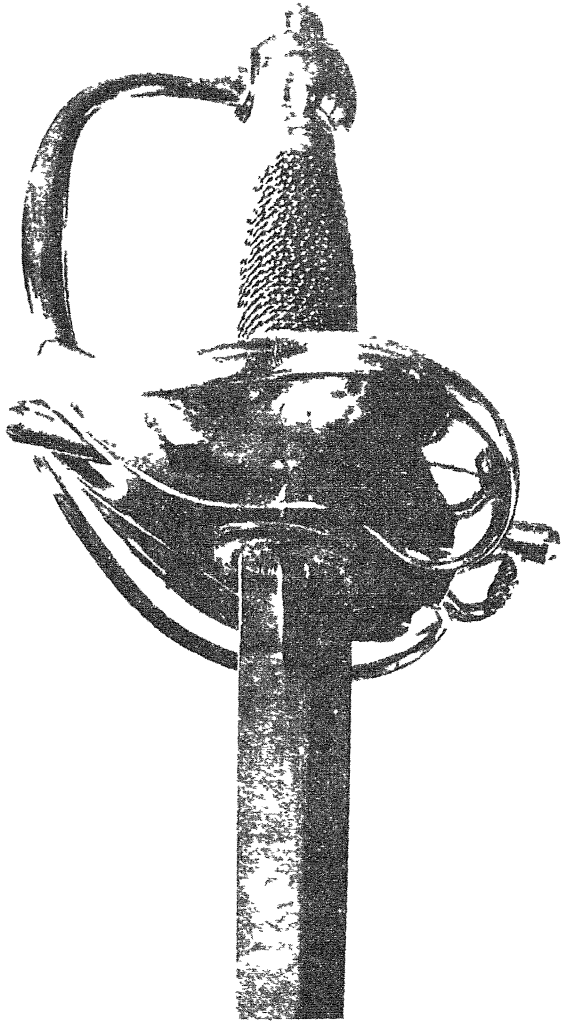


Fig 27 Sword of George IV

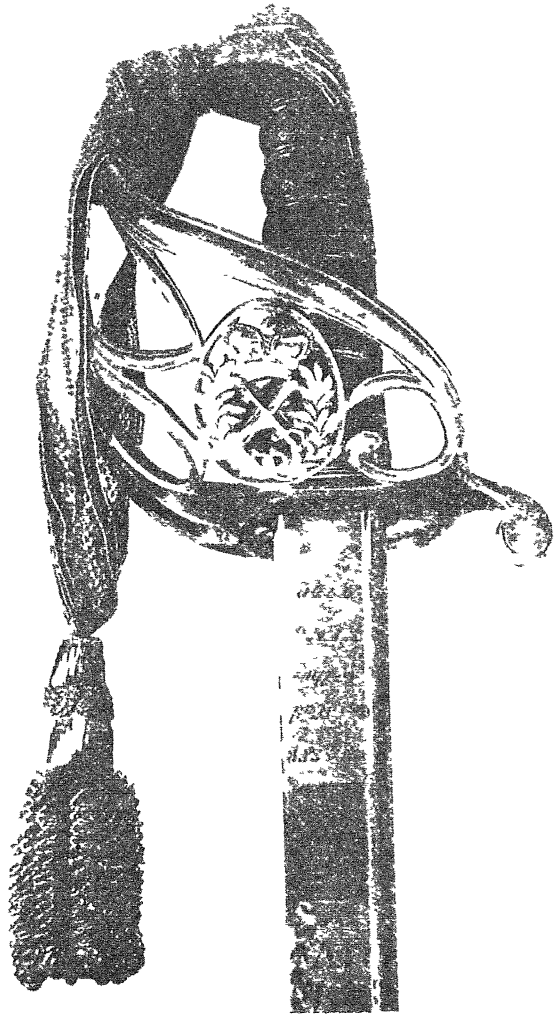


Fig 3 Sword of Frederick Augustus Duke of York

of this type in the Windsor Castle collection, but there is nothing to show that this is the sword alluded to The Royal Horse Guards carried the same sword as the 1822 pattern.

At last some attempt was made to simplify this heterogeneous confusion by the Regulations of 1874 and all the Household Cavalry officers carried the 1834 pattern till 1882, with the difference of the monograms of the several regiments.

At the present day the 1882 pattern swords are carried on ceremonial parades, but for service use the cavalry sword of 1908 was ordered in 1912 with "H C" and the regimental numbers on the handguard (Fig 24*H*).

Fig. 29 1st Horse Guards Trooper's Sword Hilt, 1751

Trooper The troopers of the Household Cavalry are somewhat easier to deal with, for we have preserved a volume entitled *Representation of Cloathing of His Majesty's Forces* (1742), produced by order of William Augustus, Duke of Cumberland [1] It contains a large number of coloured drawings which show in most cases a definite type of sword hilt In addition to this volume there are several drawings by David Morier, a Swiss (1705–70) Morier was a well-known military artist, and exhibited in London between the years 1760 and 1768. In 1742 the troopers of the Horse Guards are shown (Fig 29), the 1st, 2nd, and 4th Troops having brass hilts and the 3rd Regiment steel—all based on the basket-hilted Highland broadsword, a pattern which survived in the Cavalry from the seventeenth century The Royal Troop, the "Oxford Blues," carried the same type of hilt in a simpler form, more nearly approximating to the Highland Pattern (Fig 34*B*). From Morier's drawings we find new types of sword under the date 1751. The 1st Regiment of Horse Guards have a simpler brass hilt (Fig 29), while the 2nd Troop are shown with the 1742 sword (Fig. 30)

On November 14, 1796, a new sword was ordered for the Horse Guards,[2] but no details are given There are, however, in the Tower Armouries a large number of heavy brass-hilted swords with brass scabbards—which, for the last hundred years, have been catalogued as Life Guards swords—which may have formed part of this issue As the scabbards have the 'frog-hook' and not rings, they would certainly have been worn with a cross belt and not with waist belt and sling, as was the pattern of later date (Fig 34*C*)

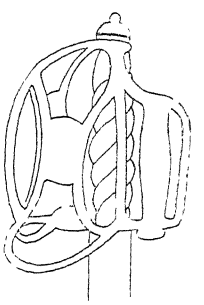
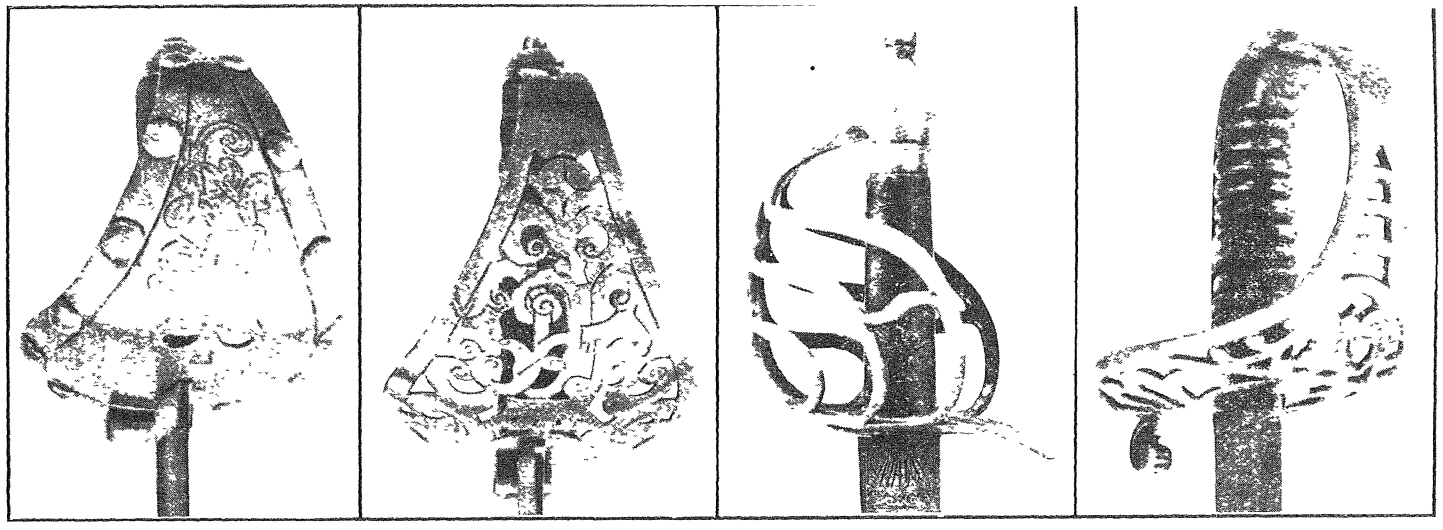


Fig. 30 Heavy Cavalry Trooper's Sword Hilt, 1742–43

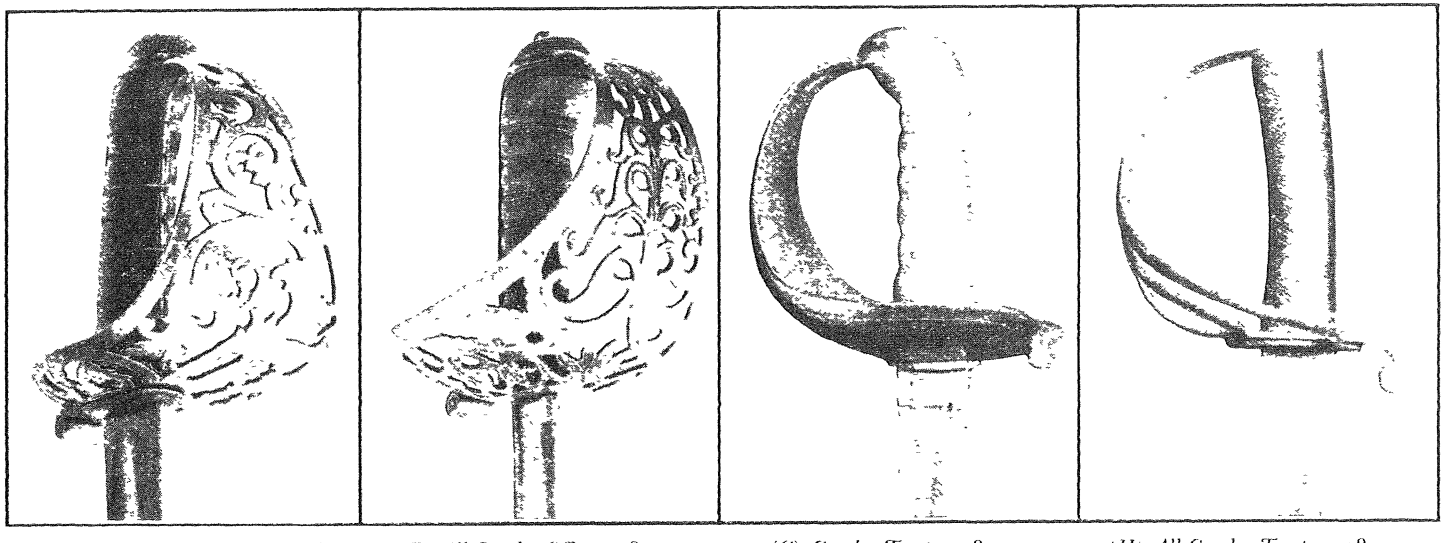
In 1807 we have a new artist to guide us in Lieutenant-Colonel Charles Hamilton Smith (1776–1859), whose sketches are to be found in the Victoria and Albert Museum Library [3] Here the "Oxford Blues" (Royal Horse Guards) wear a heavy straight sword with what is known as the 'disk' hilt (Fig. 34*D*), and in the volume referred to in the footnote the same sword is carried by the 1st Life Guards. In 1829 Hull and Englemann produced a volume of lithographs[4] which, while not so carefully drawn as those of Hamilton Smith, gave a fair representation of the sword of the Life Guards trooper (Fig 31*A*). This so nearly approximates to the design of the officer's sword of 1834 (Fig 24*G*) that it was probably issued shortly afterwards, if not at the same time Up to the present no order for this sword has been discovered

In 1860 the War Office issued a publication known as the *List of Changes*, a title which

[1] Windsor Castle Library, and Prince Consort Library, Aldershot
[2] Public Record Office, W O 3/15, p 263
[3] *Costume of the Army of the British Empire* (1815)
[4] *Costume of the British Army* (1812–30)



(A) *1st Life Guards*, 1834 (B) *Household Cavalry*, 1882 (C) *Royal Dragoons*, 1788 (D) *Cavalry Officer*, 1834



(E) *Heavy Cavalry Officer*, 1896 (F) *All Cavalry Officers* 1834 (G) *Cavalry Trooper*, 1830 (H) *All Cavalry Troopers* 1853

FIG 31 SWORD HILTS

explains itself; but for several years there were no illustrations, and when they do appear many of them are not of much use as guides, especially in the case of swords, as they are drawn in profile. In 1882 this volume gives the new Household Cavalry sword (Fig. 31*A*), which included both the Life Guards and the Royal Horse Guards. The handguard is of sheet steel, pierced with scroll work and engraved with "H C" under a crown. In 1892 the handguard is lined with white buckskin. Like the officer's sword, that of the trooper is used for ceremonial, the service sword being the cavalry 1908 pattern.

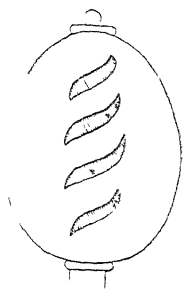


Fig. 32 Dragoon's Sword Hilt, 1742

Cavalry. *Officers.* The War Office papers (W.O.) in the Public Record Office have frequent entries respecting swords, but in only one case—which will be referred to later—is the sword hilt described. As was the case in the Household Cavalry, for nearly a hundred years the Cavalry officer wore what his commanding officer fancied, and no Dress Regulations were issued. This had evidently been considered unsatisfactory, as an order was made on May 31, 1788, that all officers of Cavalry should carry the same swords as their men. This is borne out by the first portrait of the Earl of Pembroke at Wilton House, painted by Reynolds in 1765,[1] which shows him as a colonel of the Royal Dragoons with a trooper's sword (Fig. 31*C*). Beyond the sword of the Earl of Pembroke we have no information respecting the officers of Heavy Cavalry till we come to 1822.

The Dress Regulations of this date simply describe the officer's sword hilt as "guard and boat-shell," which must have been much the same as that of the Life Guards officer as shown in Fig. 24*F*. In 1834 a new hilt was ordered of sheet steel with engraved design of what is known as 'honeysuckle' pattern (Fig. 31*D*). The Tower collection has one of these, ensigned W.R., which shows that it was in use between 1830 and 1837. Following this in the regulation of 1857 a new pattern known as the 'scroll' (Fig. 31*E*) was ordered, and this continued in use till 1896, when Heavy and Light Cavalry officers were armed with the same type.

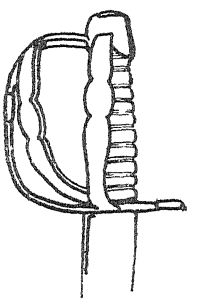


Fig. 33 Inniskilling Dragoon's Sword Hilt, circa 1805

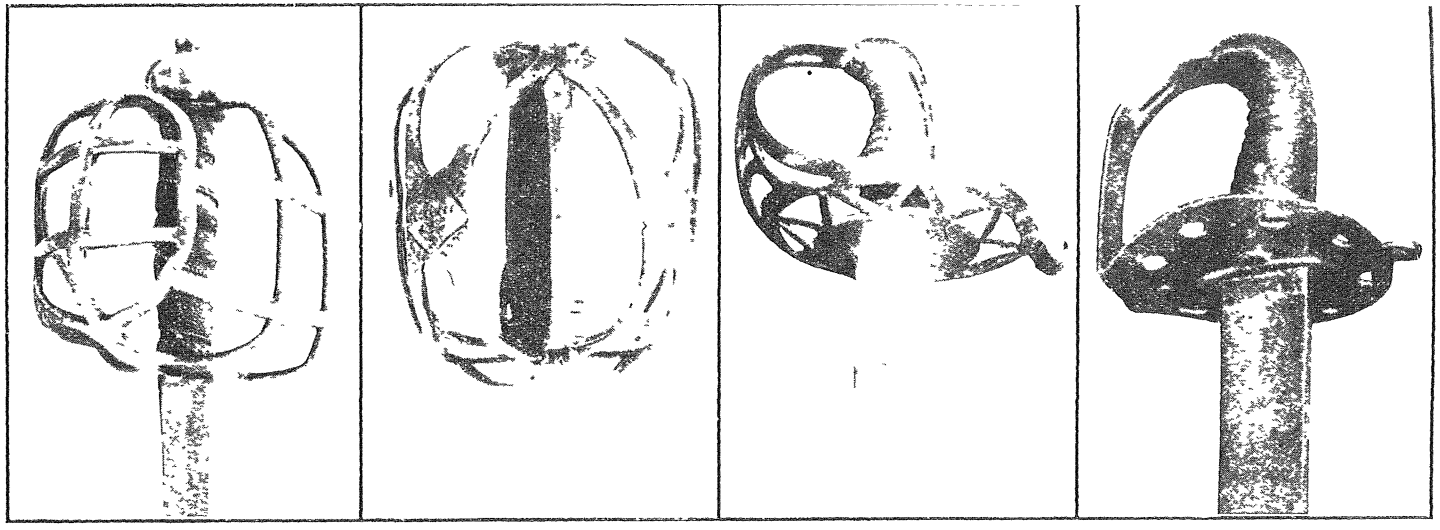
Troopers. In the Duke of Cumberland's book of 1742, mentioned previously, only Heavy Cavalry are depicted, for Light Cavalry did not come into existence till about 1756–60. These have, for the most part, varieties of the Highland broadsword hilt. This is borne out in a schedule of the equipment of Killigrew's[2] Dragoons dated 1705.[3]

Here it specifically mentions "Basket-hilted Scotch Broadsword." These were carried by the 1st, 4th Horse, the 2nd Dragoon Guards, and the 3rd to the 15th Dragoons (Fig. 30).

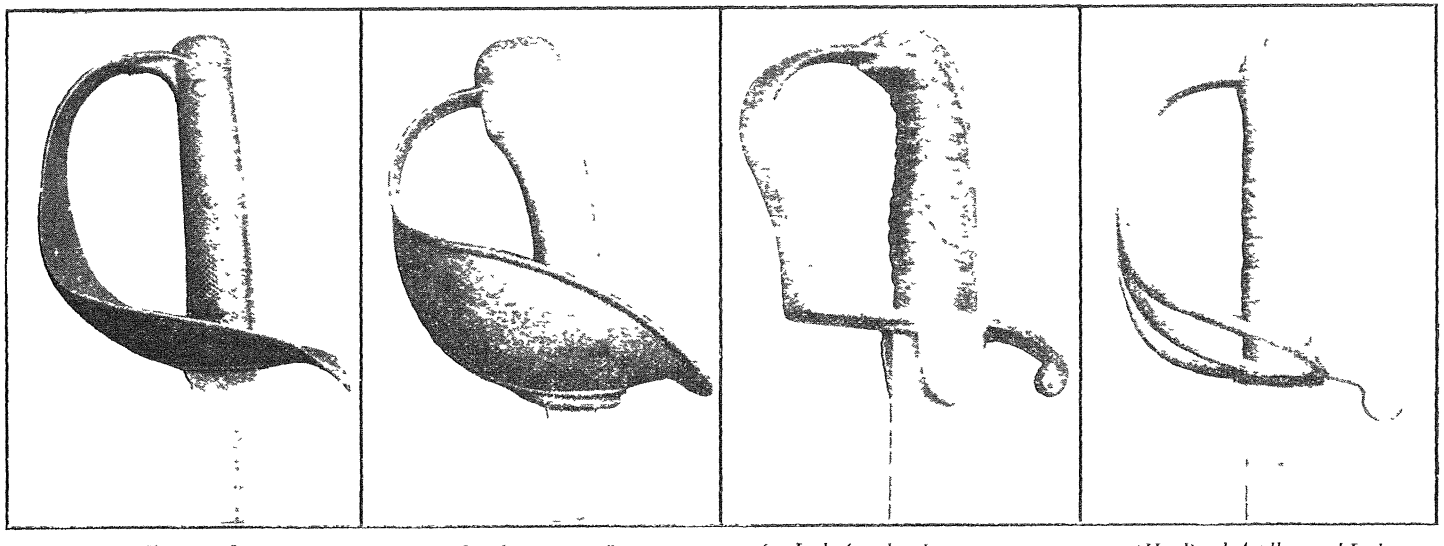
The Royal Regiment of Dragoons, however, are represented as carrying a sword the hilt of which has never been and probably never will be found (Fig. 32). In the Tower Collection are two swords which, from internal evidence, probably belonged to the 5th Dragoon Guards (6th Regiment of Horse). These show a hilt which may be a careless rendering of the sword in question (Fig. 32). This is almost identical with the sword on the portrait of the Earl of Pembroke referred to above.

Morier's drawings show varieties of the Highland sword in 1751, and for the next fifty

[1] Reproduced in the author's *Sword, Lance, and Bayonet.*
[2] Major-General, died 1707.
[3] P.R.O., A.O., 17/28, p. 154.



(A) *Trooper*, 1705 (B) *Trooper* 1751 (C) *Trooper, Early Nineteenth Century* (D) *Trooper*, 1807



(E) *Trooper*, 1899 (F) *Trooper* 1908 (G) *Light Cavalry Trooper* 1796 (H) *Royal Artillery and Light Cavalry Officer*, 1822

FIG 34 SWORD HILTS

years we have no guidance from War Office papers, for these only give vague reference to "new swords" and "swords of the Inniskilling Dragoons" with no details Possibly these were three-bar brass-hilted swords, of which several were deposited in the Tower in the early nineteenth century (Fig 33)

In Hamilton Smith's sketch-book we have careful drawings of the Heavy Cavalry sword of 1807, which was also worn by the Household Cavalry (Fig 34*D*), with the disk hilt This was a heavy weapon with hatchet-pointed blade 34½ by 1½ inches After this date, as Cavalry were subdivided into Heavy and Light, it will simplify matters if we continue to deal with the Heavy Cavalry Trooper. In 1830, with the accession of William IV., a simple pattern was issued with stepped pommel and plain steel handguard lined with white buckskin (Fig. 31*G*) This lasted till 1853, when Heavy and Light Cavalry were merged.

Light Cavalry (Light Dragoons and Hussars). *Officers.* The Regulation of 1822 orders a three-bar hilt with a curved blade 35½ by 1½ inches, and a memorandum of August 8, 1828, mentions a new pattern but gives no details.

Troopers All Light Cavalry troopers in 1823 carried a curved sword with simple knuckle-bow As these were primarily cutting weapons the tang did not perforate the whole of the grip, but was flattened with the grip riveted on either side In 1773 the 15th, and later the 8th, Light Dragoons rehilted their swords with stirrup hilts (Fig 34*G*) The sword was in use in the campaigns against Napoleon, and it has been stated that it caused such terrible wounds that the French protested to Wellington against the use of this "barbarous" weapon [1] Space will not permit an exhaustive account of the discussions which are to be found in the service papers of the mid-nineteenth century, some writers favouring the thrust and others the cut.

About the year 1850 the flat grip was abolished and a wood grip, covered with fish-skin bound with wire, was introduced. In 1853 the handguard was altered to a three-bar hilt. The grip was changed for the worse, for it was composed of two straight rounded blocks of leather, so making it difficult to hold for cutting with a hot hand, and quite useless for the thrust.

Lancers. The full-dress sword of 1822 was a highly ornamental weapon with 'Mameluke' hilt like that of the general in 1831, the scabbard being of crimson velvet with gilt mounts. The service sword was the same as that of Light Dragoons and Hussars. In 1834 the full-dress sword was abolished.

All Cavalry. In 1853 the troopers, and in 1896 the officers, of all Cavalry Regiments were treated alike, no distinction being made between Heavy and Light Regiments.

Officers. In the Regulations of 1896 the officer's sword had a solid steel handguard, narrower than that of the 1834 pattern shown on Fig 31*F*, and with more elaborate honeysuckle design. This is shown illustrated in the Dress Regulations of 1904. On March 1, 1912, the new Cavalry sword was issued for officers (Fig. 24*H*). This will be described subsequently, as the first pattern was issued to troopers in 1908 The bowl of the officer's sword is engraved with the same honeysuckle design used for the 1896 sword.

Troopers. The 1830 sword (Fig. 31*G*) continued in use in spite of its obvious disadvantages It is described as "essentially a thrusting weapon," but those who have any experience in swordmanship will agree that such action with such a sword is almost an impossibility. Still, the pattern continued in use till 1864, when a solid steel hilt, pierced with a Maltese

[1] Colonel H Graham, *History of the 16th Light Dragoons (Lancers)* (1912), I, p. 245.

cross, was introduced in place of the three-bar guard (Fig. 35).[1] This is obviously a cutting sword, but still the unpractical rounded grip was retained. In 1885 we find an extraordinary note in the *List of Changes*, which states that the angle of the grip should be altered "for facility in carrying at the slope "[2]

On June 27, 1796, the Board of Ordnance issued an instruction that cavalry swords were to undergo "a most accurate Proof at the Tower,"[3] but whether this was carried out we have no means of judging. As was the case with firearms, many weapons were imported from Germany up to the middle of the nineteenth century, one reason being that thousands of arms were destroyed in the great fire at the Tower of London in 1841, and there were few competent swordsmiths left in business in England. Evidently no proof had been carried out when the British Army were fighting in Egypt against the Mahdi in 1884. In this campaign it was reported that the swords supplied were in many cases worse than useless. Some blades broke, some bent, and the hilts were crushed. The Press stormed, and bitter comments were made in Parliament on the subject, from which it is difficult to know where the blame should be apportioned. One theory was that German blades were 'casehardened,' and that after grinding the casehardening was ground off, exposing the softer metal. Others suggested that in the press of war conditions 'accurate proof' had not been made.

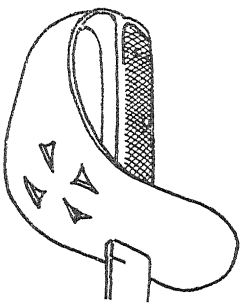


FIG. 35 ARM CAVALRY TROOPER'S SWORD HILT, 1864

As the result of what was known as the "sword scandal" a committee was appointed under Major-General D. C. Drury Lowe, with several serving officers, and Mr Latham, a member of the firm of Wilkinson and Son, the well-known company who still hold the reputation of being the finest swordsmiths in Britain, if not in Europe.

Like most of these committees the deliberations were protracted after the first meetings, and with the close of the Egyptian War in 1885 at long last a sword was produced, known as Pattern 1899. This was a clumsy weapon still with the rounded grip. With a different grip it might have been made a good cut and thrust weapon, but it was badly balanced (Fig. 34*E*). The handguard was bowl-shaped unpierced. Evidently there was some serious criticism of the new weapon, and as a result a new committee was appointed in 1903, with General Sir John French as Chairman and Major-General Douglas Haig on the committee.

But again nothing was done, as the criticisms of Captain Hutton, the noted fencer, and Colonel J. S. Napier, the Inspector of Gymnasia, were unfavourable, and again the matter was dropped.

In 1906 a new committee was formed under Major-General H. Scobell and a number of Cavalry officers, with the addition of Captain Hutton and Colonel Fox, Chief Inspector of Physical Training for the Board of Education.

Many swords were examined, and it was laid down that the sword should be solely a thrusting sword as opposed to the cut or cut and thrust weapon.

The grip, designed by Colonel Fox, is a masterpiece of ingenuity, for the moment the hand grasps it with the thumb in proper position the sword comes almost automatically

[1] *List of Changes*, 887
[2] *List of Changes*, 4854
[3] P R O, W O. 3/29, p 44.

to the 'engage' position Again Captain Hutton disapproved, as he considered it ought to have been a cut and thrust weapon, an extraordinary dictum coming from a noted fencer who surely must have known that such a weapon, perfect for either form of attack, could never be devised. Colonel Napier, evidently a sentimentalist, considered that as the soldier had used the cutting weapon for five hundred years he should continue to use it. However, at long last the pattern was decided upon and was taken to King Edward VII, who, though he was not attracted by the hilt, gave his approval on July 2, 1908. And thus, after ceaseless orders, regulations, and committees for over three hundred years the British Cavalry were armed with the finest thrusting sword which has ever been devised (Fig. 34*F*).

Artillery. Artillery, as an entirely separate branch of the Army, came into existence in 1716, but there are no records of the swords worn by officers or men till 1857, when the Dress Regulations ordered the light cavalry sword, Pattern 1853, for the Royal Artillery —the sergeants and other ranks carrying the same pattern (Fig. 31*H*). When the Cavalry were ordered a new sword in 1864 an attempt was made to bring the Artillery into line, but without result. There are no papers available to show what pressure was brought to bear, but evidently there was strong opposition, for the *List of Changes* 2870 in 1876 states that this sword was not to be used by the Artillery, who were to retain the three-bar hilt of 1853. Up to 1934 the officer's sword continued to have the three-bar hilt, but in 1925 the N.C.O.'s and other ranks of the Royal Horse Artillery were ordered the Cavalry 1908 sword.[1] In 1896 Mountain Artillery were issued with a sword similar to that of the Light Cavalry of 1790 [2]

Engineers. The earliest record that we have of the design of officers' swords is in the Dress Regulations of 1859, when the 'scroll' hilt of brass or gunmetal was ordered (Fig. 31*E*). The staff sergeants were to have the same pattern in steel and the other ranks to carry carbine and bayonet.

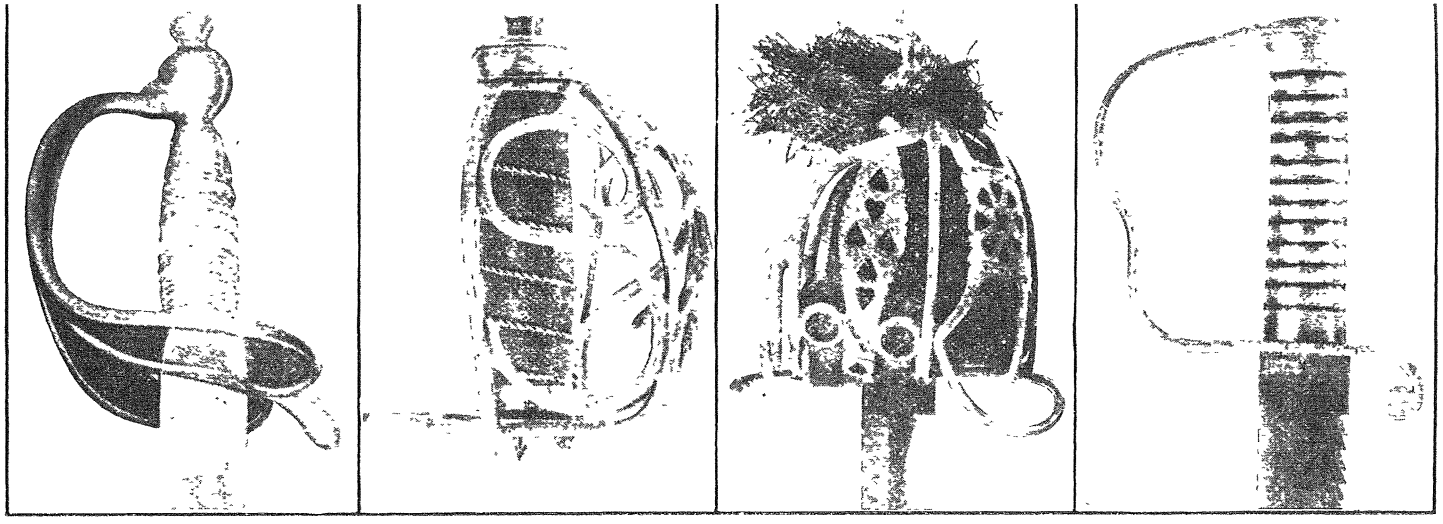
In 1895 the Royal Engineers came into line with the Infantry, and both officers and non-commissioned officers were ordered the same pattern (Fig. 36*H*).

Infantry. *Officers.* The Infantry officer's sword is in some respects easier to deal with than that of the Cavalry, though there are some notable—and not entirely official—patterns which will be considered later on. At first the officer carried a somewhat heavier variety of the 'town sword' carried by civilians, and this in time became standardized as the hilt with knuckle-bow and shells (Fig. 36*E*). On April 3, 1786, the King ordered for the Infantry a "strong cut and thrust sword 32 by 1 inches, the hilt to be of steel, or gilt, or silver, according to the buttons of the uniform."[3] On March 18, 1803, a new pattern sword was ordered for the Infantry which seems to have been much the same as the general officer's sword shown on Fig 36*G*. This lasted up to 1822. Some swords of this type are preserved in the Tower with the blades engraved "GRER GDS WATERLOO." Sergeants of the Guards Regiments carried a sword of entirely different pattern, the knuckle-bow bearing the regimental badge (Fig. 36*F*).

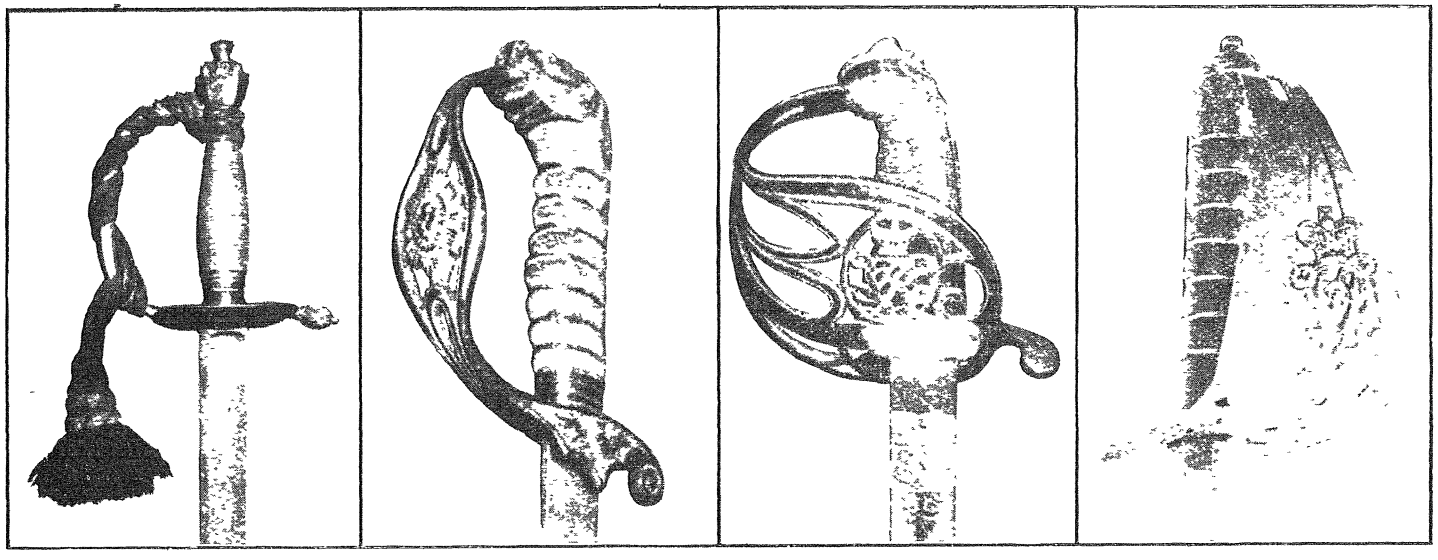
In 1822 the Infantry again followed the lead of the general officers with the 'Gothic' hilt referred to at page 34 (Fig. 24*D*).

These were all of gilt brass, with the royal cypher under a crown at the back. In some

[1] *Regulations of Equipment*, Part 2 XI, A, 1925
[2] *List of Changes*, 8368
[3] PRO, HO 50/380



(A) *Infantry 'Hanger,'* 1742 (B) *Grenadier Private*, 1751 (C) *Highland Broadsword, present day* (D) *Pioneer Sword*, 1856–1903



(E) *Infantry Officer, circa* 1750 (F) *Guards Sergeants, circa* 1803 (G) *Infantry Officer*, 1822 (H) *Infantry Officer*, 1895

FIG 36 SWORD HILTS

cases the inner part of the handguard was hinged so as to fit snugly to the body when looped up. The guard was lined with black patent leather, and the scabbard of black leather was worn with slings from a waist belt. All non-commissioned officers wore the same sword, of not such fine finish as that of the officers. The Rifle Brigade followed suit with a steel hilt bearing a bugle under a crown in place of the royal cypher.

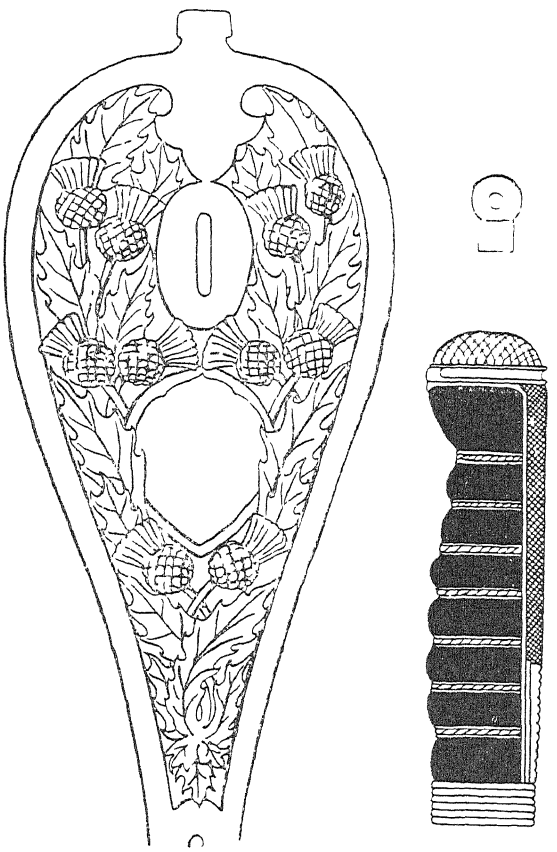


FIG. 37 THISTLE HILT
Field officers of the Royal Scots Gordon Highlanders, the King's Own Scottish Borderers, and the Royal Scots Fusiliers all carry this hilt

The blade had a 'pipe' back which, while improving the sword as a thrusting weapon, made it less effective for cutting.

In 1895 an entirely new pattern was ordered for the Infantry and Engineers, consisting of a wide sheet steel handguard with pierced strapwork and the royal cypher under a crown (Fig. 36*H*).

There are certain drawbacks to this hilt, firstly, the size, which prevents easy movement of the hand, especially for the point, and secondly, when sheathed in the scabbard in the Sam Browne belt, the inner edge is apt to chafe the tunic. This was remedied in 1897 when the edge was turned down to present a smooth surface to the body

When this change was made the Guards, Rifle, and Highland Regiments were not affected, and continued to use their former pattern.

Privates. From the formation of the Regular Army in 1661 up to 1768 the privates of Infantry carried a short cutting sword or 'hanger' in addition to musket and bayonet, the sword being the 'last-resort' weapon when the other arms were damaged or lost. As has been stated above the provision of swords was in the hands of the commanding officer, who decided upon the pattern and also the contractor, the latter being generally the sword factories of Germany—mostly at Solingen The result of this was that we find in the Duke of Cumberland's book of 1742 and in the drawings of Morier 1751 a great variety of sword hilts, some of which have been identified in the Tower Armouries. It would serve no useful purpose to describe these in detail, but the illustrations given in Figs 36*A* and *B* show two of the patterns adopted In 1768[1] a Royal Warrant orders that "all sergeants are to have swords but the corporals and men of Battalion companies, except the Royal Regiment of Highlanders, are to have no swords"

Scottish Regiments. In the eighteenth century both officers and other ranks carried the basket-hilted broadsword which even as late as the 1934 Dress Regulations

[1] P.R.O., W.O. 30/13, B., p.16

is erroneously called the claymore. The true claymore, or "Claid Heahmor," or "great sword," was a two-handed weapon with plain quillons and no guard. This weapon was favoured by the Scots in the fourteenth and fifteenth centuries, but in course of time, like the European two-handed swords, it was found to be of little use against organized troops. The Scottish broadsword was developed from an Italian basket hilt called the *Schiavona*, and for centuries the name of the Great Sword has been used to describe the Scottish weapon. The broadswords of the Scottish Infantry in the eighteenth century are varied in the detail of the handguard, some being of steel and others of brass. The blades are often marked "ANDREA FERRARA." These must have been imported from Italy, or else the marks were imitated by Scottish swordsmiths, for we have no evidence whatever that Andrea—a craftsman of Ferrara, in North Italy—ever worked in Scotland. As has been noted in 1768 the rank and file of the Infantry were ordered not to carry swords, the Royal Highland Regiment being excepted. We shall see later on, however, that the Highlanders were in some respects a law to themselves, and in 1775 they gave up the sword and preferred the musket and bayonet. Orders were issued reminding them of the new Regulation, but no notice was taken till 1783, when they returned all their swords when quartered in Nova Scotia. In 1783 the matter was definitely settled in an order of July 21 abolishing the sword for all infantrymen [1] In spite of this the prints by Sebastian Müller in the British Museum show infantrymen wearing the true Highland sword, and Grose,[2] writing in 1786, gives an illustration of a Highlander with musket, bayonet, dirk, and broadsword. A drawing by Saint Fal of the British Army in Paris in 1815 gives a Highlander wearing a basket-hilted sword of unusual type quite unlike the typical Highland pattern (Fig. 36*B*). The Dress Regulations from 1894 onward order the basket hilt only for full dress (Fig. 36*C*), and on "other occasions" a plain cross hilt, which could be interchanged with the basket hilt. Neither of these is a good fighting sword, for the cross hilt has no protection whatever and the basket hilt constricts the hand—especially for the point. At the present day officers of the Royal Scots, the King's Own Scottish Borderers, and the Royal Scots Fusiliers all carry the cross hilt.

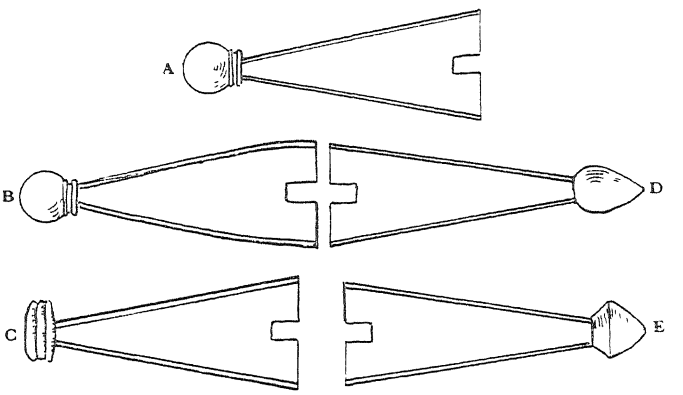


FIG 38 CROSS GUARDS

A, Seaforth, Cameron, and Argyll and Sutherland Highlanders, *B*, Highland Light Infantry and Royal Scots Fusiliers, *C*, Royal Scots, *D*, Black Watch and Gordon Highlanders, *E*, King's Own Scottish Borderers

For field officers the Scottish regiments have adopted certain 'customary' types which are not found in any Dress Regulation. These are shown in Figs. 37 and 38. The only detail as to the actual wearing of swords is a note that although swords should not be worn at Mess or for Stables, the Worcestershire Regiment Orderly Officer of the week may wear a sword at Mess. This commemorates the incident in 1746 when the Regiment was surprised at Mess when encamped on Prince Edward Island—formerly St John—and their

[1] P R O., 4 73, p 235.
[2] Francis Grose, *Military Antiquities*, chapter 1, p 166

swords in another tent were captured. They used to bear the soubriquet "ever-sworded."[1] By the Dress Regulations of 1934, Para. 59, it was ordered that swords in the Infantry are not to be worn in marching order or on service

Pioneers. The pioneer was attached to the Infantry, and as early as 1689 he is described as carrying the foot soldier's sword, together with an axe. About 1850 an issue was made of sawback swords (Fig 85), useful as saws, but terrible in effect if used as swords

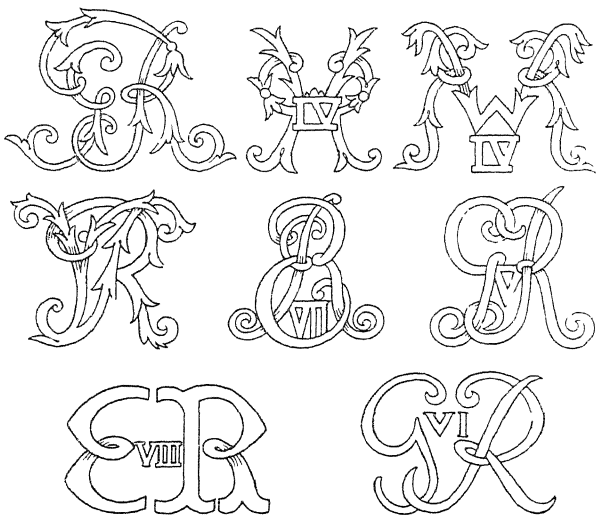


Fig 39 Royal Cyphers on Swords
George I–III George IV William IV
Victoria Edward VII George V
Edward VIII George VI

Royal Army Service Corps. This was, in 1794, the Corps of Royal Waggoners, but no records are available of any swords in use, and it is not till 1831 that we find the officers of the Waggon Train given the sword of the Light Dragoons with three-bar hilt

The train was disbanded in 1833 and was re-formed in 1855 as the Land Transport Corps and served in the Crimea. The officers carried the same sword as the Light Dragoons, and the other ranks wore a simple, short-bladed sword with brass cross hilt (Fig. 40). The Corps was disbanded after the Crimea in 1857, and no mention is made of any organization of this nature till 1865, when the volumes of *Army Equipment* give the infantry sword to the Commissariat Staff and the Light Cavalry sword to Military Train. These were only worn by officers, the men being issued with carbines and bayonets. In 1875 the two corps were combined, the Dress Regulations of 1883 giving the officers the Infantry sword.

In 1888 the Army Service Corps was formed, and the Dress Regulations of 1891 order the Artillery three-bar hilt, which is worn at the present day, for the officers.

Royal Army Medical Corps. From 1831 to 1888 medical officers of this corps were ordered the Infantry sword with 'Gothic hilt.'[2] At the present day officers wear the Infantry pattern At some date not specified sergeants carried what is described as "an obsolete drummer's sword" (Fig. 41). This was probably the sword carried in 1855. It must have been in use for some years as it was not declared obsolete till 1888.[3]

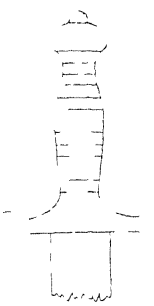


Fig 40 Land Transport Corps' Sword Hilt, 1855

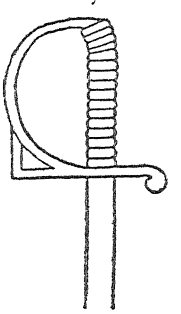


Fig 41 Army Hospital Corps' Sword Hilt 1865

Royal Army Ordnance Corps. The Ordnance was at first so closely allied to the Artillery and Engineers that it is difficult to discover what special functions were included in their activities. In 1825 they are styled the Store Branch, in 1857 they became the Military

[1] Captain H FitzM. Stack, *The Worcester Regiment*, p 561 Henry Manners Chichester and G Burges-Short *Records and Badges of the British Army* (1895), p 419
[2] *List of Changes*, 5629.
[3] *List of Changes*, 5627.

Store Branch, and in 1881 the Ordnance Store Corps. The Dress Regulations of 1844 allot to these officers the infantry sword (Fig. 36*H*) with gilt hilt and brass scabbard, the staff sergeant's sword being similar, with steel scabbard.[1] The Ordnance wear the Infantry pattern sword for ceremonial.

Royal Army Pay Corps. In all Dress Regulations from 1883 the swords are the same as those of the Ordnance.

Royal Army Veterinary Corps. The Veterinary College was founded in Camden Town in 1792. Before this date horses were treated by the Cavalry as best they might be till 1796, when a veterinary officer was appointed to each Cavalry regiment. Veterinary officers first appear in the Dress Regulations of 1861 with the Light Dragoon sword, and from that date they have always carried the Cavalry sword.

Sword-belts

From the eighteenth century the sword was carried in a frog from a belt over the shoulder, but about the beginning of the nineteenth century the sword-belt was worn round the waist with two long slings to the scabbard. For rapid movement the sword in its scabbard was carried by hand or hooked up short to the waist belt. The invention of an entirely new type of belt, known as the "Sam Browne" belt, was claimed by Sir Basil Montgomery, of the 60th Rifles, in 1878, and was worn by General Sir Sam Browne in 1879. Sir James Douglas, R.H.A., produced a similar type of belt, and improvements were made in 1885.[2] It was officially adopted on April 24, 1900.[3]

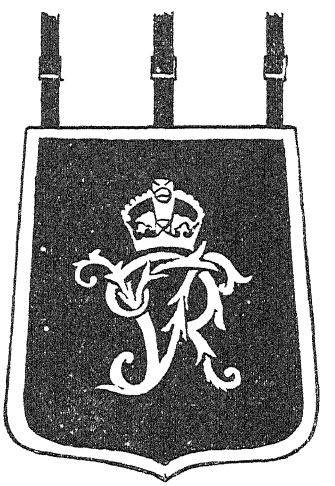


FIG. 42 SABRETACHE 1813–1900

The wearing of the cavalry sword on the near side has persisted throughout the centuries, but in our own time the frog is attached to the saddle and not to the sword-belt. When the rifle was carried in the South African War the 17th Lancers wore the sword on the off-side, and at a later date the 12th and 21st Lancers followed suit. Many years ago certain American cavalry regiments carried the sword on the near side horizontally under the left leg, the hilt pointing forward.[4]

In 1813, when uniforms of staff and Cavalry were almost fantastic in their elaborate detail, the sabretache was introduced. This strange appendage, as its name suggests, had a pocket at the back, presumably for carrying dispatches. It is described in the Dress Regulations as being of red Russia leather for the staff, of blue morocco leather for the Royal Horse Artillery, and of black patent leather for all Cavalry officers and mounted officers of Infantry, the front bearing staff or regimental devices in gilded metal. It is last mentioned in the Dress Regulations of 1900, where the date of the most recent Sealed Pattern is given as May 11, 1895 (Fig. 42).

Full details of the various belts and sword-knots, with the accompanying notes from Dress Regulations and Army Orders, will be found in the author's *Sword, Lance, and Bayonet.*

[1] *List of Changes*, 5629.
[2] *Journal of Army Historical Research*, vol. xiii, p. 243.
[3] War Office, Army Order No. 232.
[4] *Sword, Lance, and Bayonet*, p. 94.

CHAPTER III

LANCE AND STAFF-WEAPONS

The Lance

As has been previously stated, the lance (Fig 43), of all weapons that man has ever used, is the only one that is still exactly the same weapon that primeval man took from the

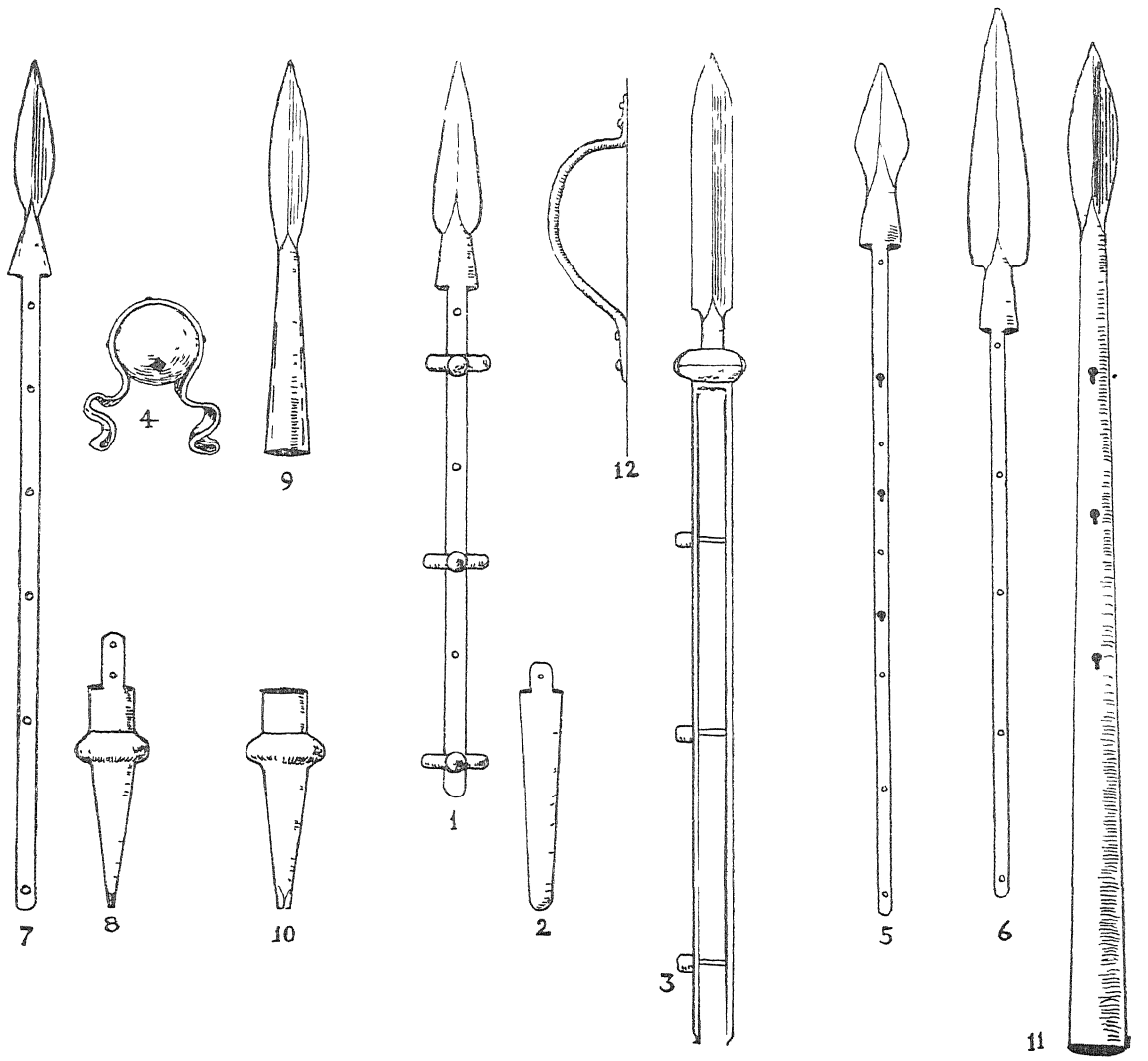


FIG 43 THE LANCE

1, head 1816 2, shoe 1816 3 head 1820, 4 joint protector 1820 5, head 1840 6, head 1846 7 head 1860 8 shoe, 1860, 9, head 1868, 10, shoe 1868 11, experimental head, 1895', 12, handguard

forest to combat his opponent with the shorter club. All that human ingenuity has accomplished has been to add a metal point.

In the fifteenth and more especially in the sixteenth century the lance was employed by heavy-armed cavalry in shock tactics. It was often of such a size and weight that a rest had to be attached to the cuirass to support it, and, in some cases, a shield or vamplate was fitted just above the handgrip. As military operations became involved in far-reaching campaigns the heavy-armed knight gave place to the lighter-armed horseman, and in turn the lance became lighter. We shall see on another page how the lance became the pike of the infantry, partly as an antidote for the shock tactics of cavalry and partly as a defence for the musketeer, but here we are solely concerned with the lance as used by the British Cavalry

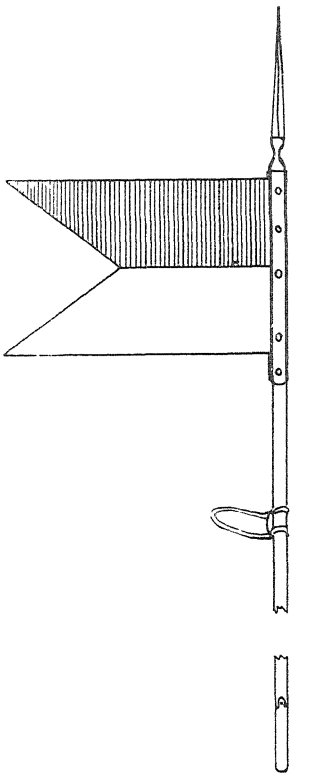


FIG. 44 LANCE AND PENNON 1829

At the end of the eighteenth century the lance ceased to exist in Europe, except in Poland, where lancers formed an important branch of the army. Napoleon was well aware of the moral effect of lancers charging infantry, and included lancers in the French Army In 1800–1 French Hussars were paraded with the lance, but not having the long training essential for the production of the skilled lance, these were adversely criticized.[1] After Waterloo the British Government realized the importance of this weapon in open country, and in 1816 Captain Peters of the 9th Light Dragoons and Lord Rosslyn were instructed to train men by way of experiment, their lances being sixteen feet long, flying small union flags.[2] On April 29 fifty men of the 9th, 12th, 16th, and 23rd Light Dragoons paraded at Pimlico for inspection by the King (George III), who complimented them on their smart appearance Colonel de Montmorency, however, thought otherwise, and was somewhat critical, stressing the opinion that it took years and not months to train a lancer.[3] Authorities differ as to the length and proper handling of the lance, Major A. Jones, V.C., recommending an eleven-foot lance and Colonel Brix, of the German General Staff, suggesting a six-foot lance held near the butt. Many various patterns were tried at different periods (Fig. 43).

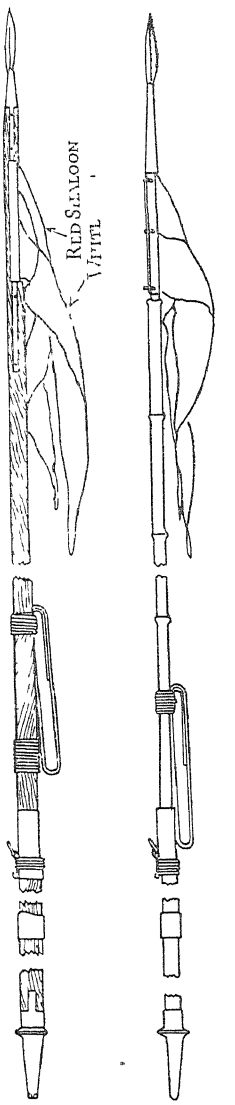


FIG. 45 LANCE, 1889

In 1827 a committee[4] was formed to design a new pattern lance, and eventually a sealed

[1] Frederic Masson *Cavaliers de Napoleon* (1896) Fuller details of these staff weapons will be found in *Sword, Lance, and Bayonet*

[2] Colonel H Graham, *History of the 16th Light Dragoons* (1912)

[3] Lieutenant-Colonel R H de Montmorency, *Rules and Regulations for the Exercises and Manœuvres of the Lance* (1820).

[4] War Office Submissions, 1829

pattern was approved on February 24, 1829 (Fig. 44). The chief details to be altered from time to time were the form of the blade or point, the shoe, and the langets, or steel plates, to protect the lance from sword cut. The most-favoured staff was that made from the male bamboo, but as it was not always possible to get these in sufficiently large quantities an ash staff was employed. The lance point and the shoe are held in place by shellac and pins (Fig. 45). Several writers in the *Journal of the Royal United Service Institution*[1] have argued as to the merits and faults of various types of lance, but most of them agree on its moral effect if used by skilled men. Lancers have been in action in Indian campaigns, but the Boer War showed that the rifle was to be the new cavalry weapon, and the war of 1914–18 produced an entire change in cavalry operations. On flat country, more especially for pursuit, the lance came into action. In France the 12th Lancers, and in Palestine the Indian Lancers, gave a good account of themselves

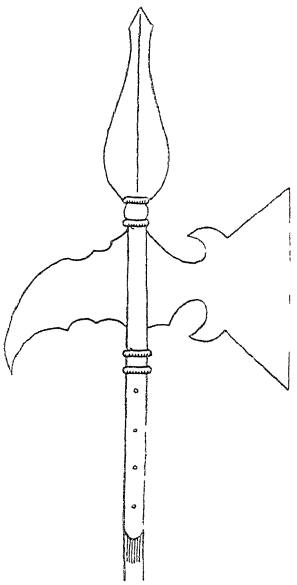


FIG. 46 SERGEANT'S HALBERD, 1700–99

The lance was abolished as a service weapon in 1903;[2] in 1909 it was again ordered for service,[3] and in 1927 again abolished.[4]

The Halberd

The genesis and gradual decline of the use of the halberd has been noticed at pages 24, 25, 51, but it remained as an unsatisfactory weapon when the Royal Army was formed in 1672. By a warrant of April 9 of that year halberds were issued to the Dragoons.[5] It was a somewhat unwieldy arm for a mounted man, and by the end of the century halberds were only allotted to sergeants of infantry (Fig. 46). In 1769 sergeants of Grenadiers were ordered to carry fusils (short flint-locks) in place of halberds,[6] and by 1792 these were abolished in favour of the pike.

The Pike

Very early in the history of the formation of the Regular Army the pike was discarded. Like so many early weapons it had several disadvantages. From sixteen to eighteen feet in length, it was inconvenient to handle on parade or in drill, as the pikemen were formed up with outstretched arms, each man touching the hand of the next on the rank (Fig. 18). In action the pikemen knelt on one knee with the butt of the pike in the ground, the point being aimed about the height of a horse's chest. In this position they served as a refuge for the musketeer during the lengthy process of reloading. There was, however, the risk in a charge of heavy cavalry of some courageous horseman sacrificing himself and his horse by riding on to the pikes and thus disorganizing the ranks of the infantry. When the pike was abolished the infantry relied on the musket, and later on the musket and bayonet.

[1] Vol xlvii
[2] Army Order No 39, March 1903
Army Order No 158, June 1909
[4] Army Order No 392, December 1927
[5] P R O , W O 55/333, p 148
[6] P R O W O 3/24, p 104

The Spontoon

This weapon was purely a decorated form of broad-bladed spear carried by officers from 1700 to 1769. It had no value whatever as a weapon, and was only used for parades. By 1786 it was abolished,[1] and the officer was left with his sword both for parade and for battle. Since then it has been carried for ceremonial by the Gentlemen at Arms, the Yeomen of the Guard, and by Sheriff's guards for the judge at assizes.

Five years later, in 1791, we find in the War Office Orders and Memoranda a note:

> The Halberd now carried by Sergeants of the Infantry being a confessedly heavy and unwieldy weapon it has been represented to His Majesty that a pike or spear would be more convenient for carriage and more useful in the ranks Trials have been ordered upon the comparative merits of the two weapons [2]

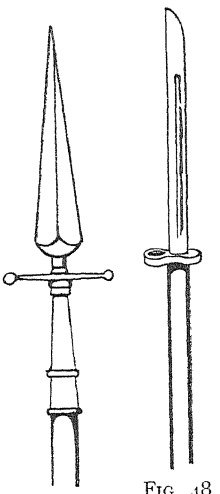


FIG 47. SERGEANT'S PIKE, 1791–1830

FIG 48 HOME GUARD PIKE, 1942

In February 1792 it is ordered that halberds are to be laid aside and pikes, "a new species of arms," are to be substituted. This weapon had a spear-point with a cross-bar or toggle, similar to the boar spear of the reign of Henry VIII (Fig. 47). The spontoon, sergeants' pike, or crossbar spear as it is called by different writers, was mostly used for dressing the ranks or for tying up to form a triangle when a man was sentenced to flogging. It was also employed to form a palisade, when joined together as described at page 135. Military prints show the sergeant, armed with his spontoon, guarding the ensign who carried the regimental colour. It was abolished from the infantry in 1830,[3] but according to tradition it was still carried by the artillery as late as 1845.

In 1942, when there was a serious shortage of rifles for the Home Guard, pikes formed of bayonets welded in an iron pipe were issued, thus taking the Home Guard back to the days of the threatened invasion from the Spanish Armada in 1588. These weapons were not popular, and were only used in outlying country districts for night scouting (Fig. 48).

[1] PRO HO 50/380
[2] PRO WO 3/10, pp 72, 78, 96, 128.
[3] General Order, July 31, 1830, No 491

CHAPTER IV

LONG-BOW, CROSS-BOW, FIREARMS, GRENADES, PISTOLS

The Long-bow, Cross-bow, and Firearms

THESE three types of long-distance weapons must be considered together, for they followed each other, and in fact overlapped each other so closely, that it would not be wise or convenient to dissociate the one from the other.

For thousands of years the simple bow held its own as a long-distance weapon, and spread from nations whose history is still buried in the past all over the world. It had three distinct advantages in that it was cheap to produce, had a fairly extensive range, and provided rapidity of discharge. There will be no need to dwell on the constructional details as the simplest illustrated historical work will provide illustrations We first find it in the pictorial records of England displayed on the Bayeux Tapestry, probably produced at the end of the eleventh century. The strength of the bow is calculated by the power whereby it restores itself to its natural position, according to the distance from which it is removed, and here the physical strength of the archer is the deciding factor in the effective range. The estimated range of the English bow was 200 to 250 yards; indeed, Shakespeare[1] puts it at 290 yards Sibbald Scott[2] gives a reference to King Edward VI's journal which states that the King's archers could pierce completely a board one inch thick Each archer was required to carry two bow-strings and twenty-four arrows at his side or back, each arrow being half the length of the six-foot bow[3]

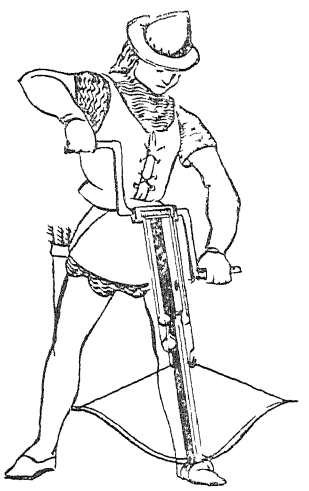


FIG. 49 WINDLASS CROSSBOW SIXTEENTH CENTURY
Bib Nat Paris

W. Neade, the inventor of a combined long-bow and pike, in his pamphlet *Double-armed Man* (1625), at a time when the muzzle-loading musket was used all over Europe, gives the effective range as sixteen to twenty score yards, and states that the archer could discharge six arrows while the musketeer loaded and fired but once

The cross-bow, known in Europe as early as the twelfth century, was in design a much reduced model of the Roman balista. It had two advantages over the long-bow in that the archer could aim more precisely and that it did not need the great physical strength of the English bowman (Fig. 49). In those days, as war was a more or less decent operation, this new invention met with such strong opposition from the nations who did not use it that at last Pope Innocent II in the Lateran Council of 1139 forbade its use, at any rate against Christians. But, like other prohibitions of war equipment even in our own time, the edict was honoured solely in the breach by most nations, though England held to the long-bow while there were capable archers still in the army The cross-bow became larger, heavier, and more complicated, and was eventually given up when firearms became popular It was from the cross-bow that the

[1] *Henry IV*, Part II Act III, Scene ii
[2] *The British Army its Origin, Progress, and Equipment* (1867), vol ii, p 94
[3] Akerman, *Archæologia* (1860), vol xvii

'tricker,' or trigger, lock (Fig. 50) was copied for use with the match-lock musket, the lock being employed not to release the string of the cross-bow, but to hold the slow match and bring it down upon the pan, which had a sliding cover (Fig. 51). Sir John Smythe[1] states that the musket first appeared in Italy in 1530, but he realizes the uncertainty of the musket or arquebus as against the simplicity of the bow.

So heavy was the arquebus that it had to be fired on a rest and, in addition to the weight of musket and rest, the musketeer had to carry a bandolier of charges in wooden patrons, or cases, a supply of bullets, a powder-horn, and a sword (Fig 18). It will be needless to point out that as rapid loading and firing, which necessitated twenty or more orders, could not be carried out with safety in the open, the musketeer had to retire under the protection of the sixteen-foot pike of the infantry

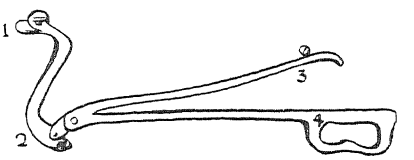


FIG 50 TRICKER-LOCK, SIXTEENTH AND SEVENTEENTH CENTURIES
1 jaws, 2 tumbler, 3, scearspring, 4, tricker

As the musketeer on active service had to carry the match, three yards of cotton cord soaked in saltpetre, always smouldering, was a serious danger with loose powder in barrels or in bandoliers; and also the glow gave away his position to the enemy. In order to

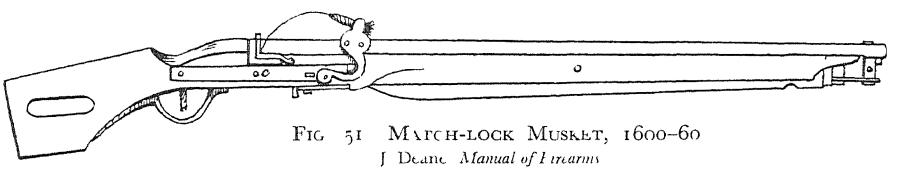


FIG 51 MATCH-LOCK MUSKET, 1600–60
J Deane *Manual of Firearms*

cover the spark and also—most important—to protect it from the rain, the burning end of the match was carried in a small metal tube, or in emergency in the musketeer's hat[2] (Fig. 52).

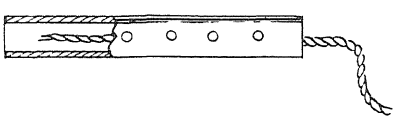


FIG 52 MATCH-HOLDER SEVENTEENTH CENTURY

The next invention was the wheel-lock, a most complicated piece of mechanism produced in the middle of the sixteenth century (Fig. 53). The lock consisted of a serrated wheel of steel wound up against a spring by a key When the spring was released the wheel revolved rapidly, coming in contact with a piece of iron pyrites held in the jaws of the cock, the resultant sparks igniting the fine powder in the pan. The invention of this lock was to do away with the dangerous coil of match. It was fitted to short carbines or pistols

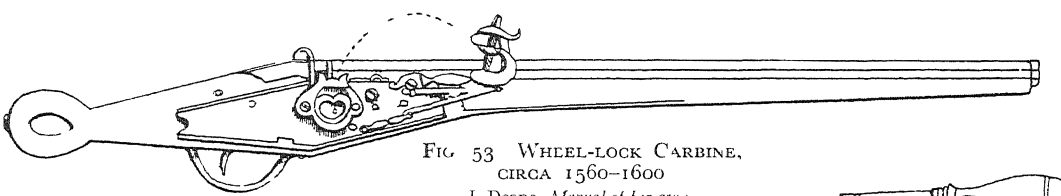
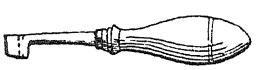


FIG 53 WHEEL-LOCK CARBINE, CIRCA 1560–1600
J Deane, *Manual of Firearms*



WHEEL-LOCK KEY

for ease and convenient handling, and was chiefly used by the cavalry. The expense of manufacture was, however, so great that the wheel-lock was never used by the rank and file, who still held to the match-lock. The

[1] *Instructions, Observations, and Orders Militarie* (1595)
[2] R Ward, *Animadversions of Warre* (1639), p. 394

wheel-lock being admittedly too complicated a weapon for rough usage, a simpler lock was produced about the end of the sixteenth century, known as the 'snaphance.'[1] There have been several explanations of the word, the most popular being that it was derived from the German *Schnapphahn*—poultry stealer.

Here the operation is reversed, for the cock holds a piece of flint which, when the trigger is pulled, strikes a piece of serrated steel—the hammer—and sends the sparks on to the pan below. These weapons occur in many of the inventories and equipment schedules of the seventeenth century, which show that it was used particularly by the cavalry, the infantry continuing to be armed with the match-lock.

About 1645–50 the snaphance was improved by having the hammer and pan cover made in one piece so that the powder in the pan was protected from wind and rain, but when the trigger was pulled the hammer and pan cover on a pivot flew up, exposing the powder to the flash. Thus was evolved the flint-lock (called familiarly "Brown Bess"),[2] the firearm in use in every army of Europe for nearly two hundred years (Fig. 55). It was the simplest, cheapest, and most easily made in local workshops, but it had serious disadvantages. To fire it the infantryman had to load with powder and ball, ramming well home with his ramrod or scouring stick, replace the ramrod, open the pan, pour powder on the pan, close the pan, aim, and fire. Even if these operations were carried out with disciplined speed the powder on the pan might get damp and the flint worn out, which necessitated unscrewing the cock and inserting a new flint, often under fire, after every twenty rounds fired (Fig 54).

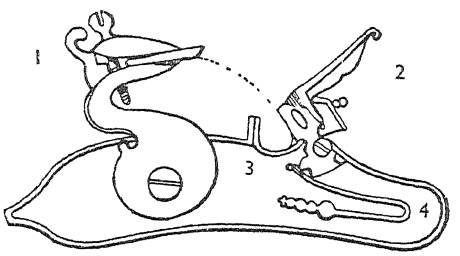


FIG. 54 FLINT-LOCK. 1650
1, cock 2 hammer, 3, pan, 4, hammer spring
Treatise on Military Small Arms (1888)

So uncertain was the efficacy of the flint-lock that for fifty years the match-lock was still used by the infantry, till a Warrant of April 14, 1690, armed the whole Army with the flint-lock and abolished the match-lock The effective range was very limited; indeed, as late as 1846 it was limited for all practical purposes to 100 to 150 yards,[3] the common dictum being not to fire till you could see the whites of the eyes of the enemy. When one compares this with the range and speed of shooting of the long-bow recorded at page 52 one is apt to wonder why the long-bow was abolished so soon in favour of the early firearm. This was realized as late as 1792,[4] when Lieutenant-Colonel Lee, of the 44th Regiment, advocated the use of the long-bow in preference to the flint-lock musket, for these reasons:

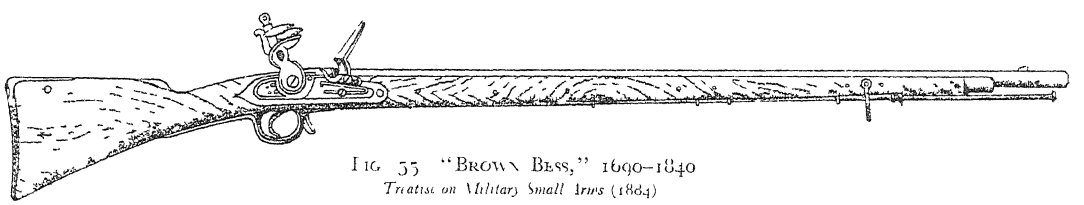


FIG. 55 "BROWN BESS," 1690–1840
Treatise on Military Small Arms (1884)

(1) Because a man may shoot as truly with the bow as with a common musket.

[1] *Norfolk Archæology*, vol 1, *sub anno* 1388

[2] It may be of interest to note that the infantrymen who surround the Duke of Wellington's statue at Hyde Park Corner carry French flint-locks and not 'Brown Besses'

[3] Lieutenant-Colonel H Bond, *Treatise on Military Small Arms* (1884), p 197.

[4] *Memoirs of the Life of the late Charles Lee Esq* (1792), p 316

(2) He can discharge four arrows in the time of charging and discharging one bullet.
(3) His object is not taken from his view by the smoke of his own side.
(4) A flight of arrows coming upon them terrifies and disturbs the enemy's attention to his business.
(5) An arrow sticking in any part of a man puts him *hors de combat* till it is extricated.
(6) Bows and arrows are more easily made anywhere than muskets and ammunition.

In the eighteenth century there was no mass production and barrels, stocks, and locks were all made in local workshops—largely in Germany. In addition to those supplied by the gunsmiths in the Minories, near the Tower of London, in 1759, three thousand muskets came from Dublin, and forty years later we imported forty thousand from Hamburg and other parts of Germany. This putting out of contracts was not such a serious matter in the case of locks and stocks, but the difference in measurement of the outside of the barrel made the fitting of bayonets very difficult and created much confusion in the issue of stores.

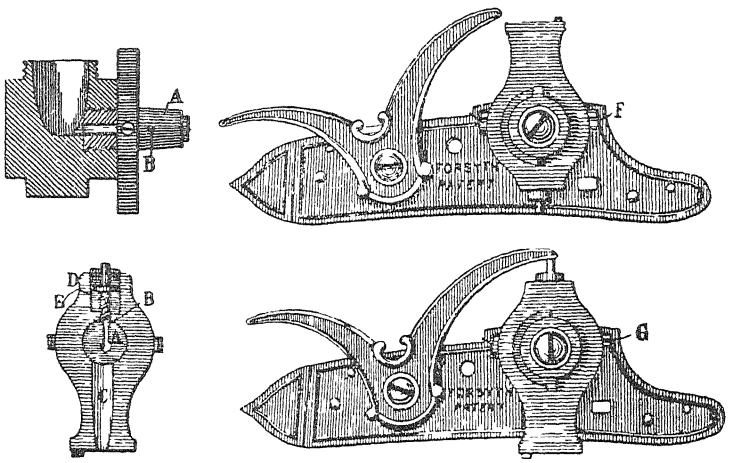


FIG 56 FORSYTH LOCK, 1807
A, roller, *B*, pan in the roller *C*, container of the priming-powder *D* punch socket, *E* punch and spiral springs, *F*, handle' (priming position), *G*, 'handle (firing position)

About the year 1812 this chaotic condition of things was realized, and the Government took over the small arms factory at Enfield in the face of strong opposition from the trade. Here, eventually, gun barrels were made, the gun locks being made at the Tower. By 1859 the gunmakers' contracts were closed as the Enfield Factory could produce one hundred and thirty thousand muskets complete with bayonet.

And now we come to an epoch-making invention which needs more than passing notice. Far in the North a Scottish minister, the Rev. Alexander Forsyth, of Behelvie, Aberdeenshire, had been for some years experimenting with fulminates and detonators, for he found that, as a sportsman, he had so many misfires with the flint-lock that some more certain method might be employed for firing the charge.

In his little workshop adjoining his manse he at last produced a gun which could be fired by percussion with little, if any, chance of a misfire. This was brought to the notice of Francis Rawdon, Earl of Moira, Master General of Ordnance 1806–7, who persuaded Forsyth to come and continue his experiments in the Tower of London. Work with fulminates and detonators was so dangerous that Forsyth could get no assistants to help him. This is not to be wondered at when the same experiments conducted in France cost the lives of M. Letort, Director of the Experimental Works at Essonne, his daughter, and four workmen.

However, the courageous Scotsman continued till a new Master General of Ordnance

was appointed who summarily turned Forsyth out of the Tower with orders to remove "all his rubbish." Nothing daunted, Forsyth returned to his manse and at last perfected his lock, for which he took out a patent in 1807 (No 3032) (Fig 56) The principle was that the container, pivoted under the hammer, was divided in half—the lower portion being filled with the detonating compound closed with a ball valve. On turning this down a small amount dropped into the upper half, which was then turned back. When the trigger was pulled the spring pin was struck by the hammer and the charge fired through the vent.

All sportsmen immediately competed for this new gun, and Forsyth had to spend time and money in fighting infringements of his patent in France and elsewhere.

There is a legend among his collateral descendants that Napoleon offered him £20,000 for his invention, but the patriotic Scottish minister naturally refused The British War Office was at that time fully engaged in the campaign against Napoleon in Spain and, perhaps rightly, Wellington could not afford to change his flint-lock for a new invention which was not only very expensive but also had not been subjected to drastic tests. And thus the whole matter was shelved, as far as the War Office was concerned, till 1834 In that year tests were made at Woolwich between six flint-lock muskets and six percussion muskets of Mr Forsyth's invention, with the result that out of 6000 rounds—taking into consideration misfires—the decision was one to twenty-six against the flint and in favour of the percussion system [1] It is not clear whether Forsyth's original lock was used, but it is more than probable that the simpler copper cap containing Forsyth's detonator was fitted to the competing musket, an invention attributed to several gunsmiths It was claimed in America that it was invented, but not patented, by Captain Shaw of Philadelphia in 1814, in France by Deboubert of Paris in 1820,[2] and in England by Egg, Wilkinson, Lancaster, Westley-Richards,[3] and several other English gunmakers between 1812 and 1825.

But to return to Forsyth. After the triumph of his percussion principle over the flint-lock the Army was convinced of its importance, and by 1842 all flint-locks were converted to percussion, the 2nd Border Regiment claiming to be the first regiment to use it in action at Amoy, China, on August 26, 1841.[4]

In 1842 the following were the particulars of the percussion musket weight, 9 pounds 14 ounces, barrel, 39 inches, bore, 753 This large calibre was decided upon so that we could take the balls of France, Belgium, Russia, and Austria, but they, using smaller calibres, could not take ours.[5] Then followed a campaign in the Press and in Parliament as to the proper recompense for the inventor, and, after much undignified haggling, the Government awarded him £1000, the first instalment being paid on the day of his death on June 11, 1843.

Amongst his varied scientific interests, Forsyth had read of the experiments of Volta and Galvani In one of his letters he suggests that this force might possibly be used to move vehicles, and he hazarded the remark that "one day we may be able to convey our thoughts by galvanic power."[6]

On January 30, 1930, a tablet was erected in the Tower of London by public subscription, at the unveiling of which Lord Cottesloe, Chairman of the National Rifle Association, said

[1] *Treatise on Military Small Arms* (1884), p 195
[2] John Deane, *Manual of the History and Science of Firearms* (1858), pp 80–89
[3] W W Greener, *The Gun and its Development* (1888), p 111
[4] *Sword, Lance, and Bayonet*, p 133
[5] *Treatise on Military Small Arms* (1884), p 196
[6] Major-General Sir Alexander Forsyth Reid, *The Rev. A. J Forsyth* (1910), p 12

that Forsyth was the only man in the world in whose honour a salute was fired every day in the year. For the boy with his toy pistol, the sportsman with his gun, the soldier at the rifle-range or in battle, and the gunner at the heavy gun all unconsciously paid a tribute to the modest but courageous Scottish minister who invented the percussion lock.[1]

The majority of the army weapons were smooth bore, for the system of rifling was too complicated to employ it on a very large scale. The actual grooving of barrels to communicate a 'spin' to the bullet had been invented by Kotter of Nuremburg as early as 1520, but it was not till seventy years later that we have some account of the process. The process of rifling a barrel does not come within the purview of the present work, but for the reader who is interested in the craft of the gunsmith a simple description of the operation is given (p 273) in *The Gun*, by W Greener (1881).

Sir Hugh Plat writes in 1594 "how to make a pistol two feet in length . . . having eight gutters somewhat deeper in the inside of the barrel and the bullet a thought bigger than the bore is rammed in and afterwards driven downe with a skowering stick."[2] Benjamin Robins[3] had for twenty years been studying the subject, and speaks of the rifle as well known on the Continent and but little known in England;[4] but it was not till 1800 that the noted gunsmith, Ezekiel Baker, published his *Remarks on Rifle Guns*. This work was produced in the same year that the Government adopted his rifle for the Army, and issued it to the 95th Regiment, now the Rifle Brigade. The rifle weighed 9½ pounds, the barrel was thirty inches in length, had seven grooves, and a calibre of ·653, the lock being, of course, the flint lock.

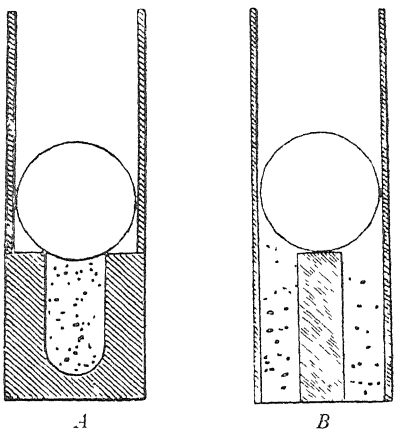


FIG. 57 *A*, DELVIGNE'S BREECH, 1826
B, THOUVENIN'S BREECH 1828
Treatise on Military Small Arms (1888)

Now, the difficulty of forcing the bullet into the grooves of the rifle was appreciated as early as 1594, mentioned by Sir Hugh Plat—quoted above—and several projects were put forward to load the ball easily and yet force it to fit the grooves closely. The French tried various devices, but there were drawbacks to most of them.[5] In 1826 M. Delvigne, a French officer, suggested placing a small chamber at the breech having an abrupt connexion with the bore The charge of powder rammed into the chamber, and the ball, rolling easily down the barrel, would be so rammed that it spread on the chamber edge and fitted, more or less, into the grooves of the rifling

Another project, put forward by Colonel Thouvenin, of the French Artillery, was a pin of steel projecting from the base of the bore (Fig 57). The powder would lie round the pin, and the ball, being rammed on to the pin, would spread in much the same manner as Delvigne suggested. The objection to both these methods was that the powder was rammed too tight, and the ball also lost its spherical shape where it was hit by the ramrod. There was also the risk of fouling, either in the chamber or round the pin.[6]

Various types of bullets were tried, but with little success till 1838, when the Brunswick

[1] *The Scotsman*, January 30 1930
[2] Sir Hugh Plat *Jewell House of Art and Nature* (1594)
[3] *Mathematical Tracts* (1761)
[4] T F Fremantle (Lord Cottesloe), *The Book of the Rifle* (1901), p 11
[5] *The Book of the Rifle*, pp 36, 37
[6] *Treatise on Military Small Arms*, pp 199, 200

percussion rifle was issued to rifle regiments (Fig. 58). This had two straight grooves, and the spherical ball had a projecting belt which fitted into the grooves at the muzzle

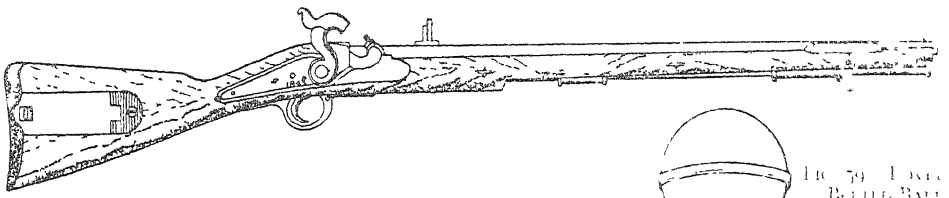
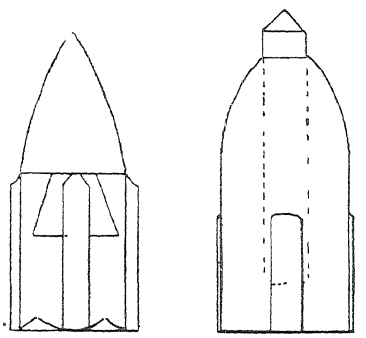


FIG. 58 THE "BRUNSWICK" RIFLE, 1836
Treatise on Military Small Arms 1851

FIG. 59 [illegible] BULLET

(Fig. 59). Deane states that it was designed by Mr Lovell, the last Inspector of Small Arms for the British Board of Ordnance.[1] It is sometimes suggested that this was the invention of Captain Berner, of the Brunswick Jagers, but his rifle with an elliptical bore was an entirely different weapon. The objections raised were twofold: firstly, that fouling accumulated, and secondly, the ball, being carried in a pouch, was apt to get bruised and distorted. The lock was fitted with Forsyth's detonator, consisting of fulminate of mercury contained in a tube which passed through the wall of the barrel at the breech end and was fired when struck by the falling hammer or cock.[2]



JACOB'S BULLET JACOB'S SHELL

This most unsatisfactory system of muzzle-loading continued to be employed for sixteen years, till in 1852 a committee appointed to deal with the whole question reported that:

> . . . the loading of this rifle is so difficult that it is a wonder how the rifle regiments have continued to use it so long, the force required to ram down the bullet being so great as to render any man's hand unsteady for accurate shooting.[3]

But this had already been realized by that most remarkable soldier, General John Jacob, engineer, artillery, cavalry, and political officer, who submitted improvements designed, and to a large extent made, by himself, but to no purpose. In face of the opposition at home he produced a four-grooved rifle (Fig. 60) which he tested at ranges he erected at Kahnghur, on the Western frontier, the extreme target being at two thousand yards, and even suggested that his rifling could be used for artillery with an effective range of fourteen miles. Again he submitted his new rifle to the home authorities, who replied that "what is good enough for the Royal Army is good enough

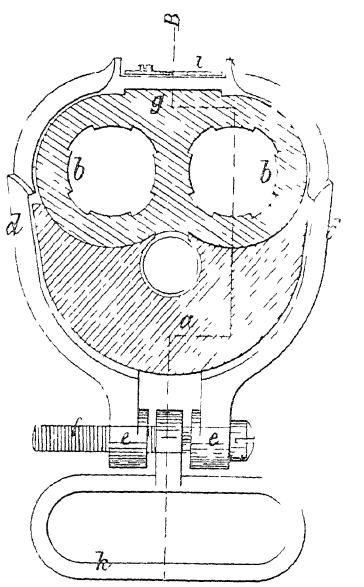


FIG. 60 SECTION OF JACOB'S DOUBLE-BARRELLED RIFLE, 1851–58
From the specification in the Patent Office

[1] John Deane, *Manual of the History and Science of Fire-arms*, p 235
[2] *Text Book of Small Arms* (1929), p 205
[3] *The Book of the Rifle*, p 31

for the Hon. East India Company." Nothing daunted, Jacob raised two rifle regiments, which he armed with his rifle and continued his experiments till 1857, when he was transferred to a command in Persia. In his absence the authorities in India came to the very proper conclusion that he was the most capable officer for the command of the Army of Central India. He was recalled, but his ship was seriously delayed, and General Hugh Ross, afterwards Field-Marshal Lord Strathnairn, was gazetted in his place for this command In the following year, 1858, Jacob died at the early age of forty-six, disappointed and rewarded only with the C.B., his deathbed being surrounded only by the men of the Sind Horse, who loved him as their leader and friend But Jacob's rewards are in some respects greater than those achieved by any other officer in the British Army: he raised two cavalry regiments, one battery of artillery, two rifle regiments, and invented one rifle, all of which, after a lapse of over eighty years, still bear his name to-day. In addition to this, the mud village where he erected his rifle ranges spread so rapidly that he brought the waters of the Indus by canals for over sixty miles and established a new town with a Residency and a population of over 10,000, increasing in prosperity Jacob's name here was held in such respect and affection that no walls or forts were needed, the personality of its founder and his firm but understanding discipline being its main defence. At last the Indian Government were compelled to take action, and on November 10, 1852, the Governor-General, Lord Dalhousie, ordered that the name of Khangur should be changed to Jacobabad, a name which is found in every atlas that is published to-day.[1]

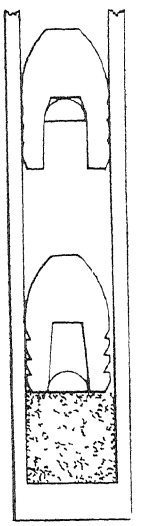


FIG 61. THE MINIÉ BULLET, 1855
J Boucher, *The Volunteer Rifleman*

The next system put forward was in some respects the simplest, though as time went on it was found to have certain disadvantages. This was known as the Minié rifle (Fig. 61).

In 1847 Captain Minié, of the Chasseurs d'Orleans, a French rifle regiment, had devised a pointed bullet with a hollow base in which an iron cup was inserted. This could be loaded easily at the muzzle and on the charge being fired the iron cup was forced

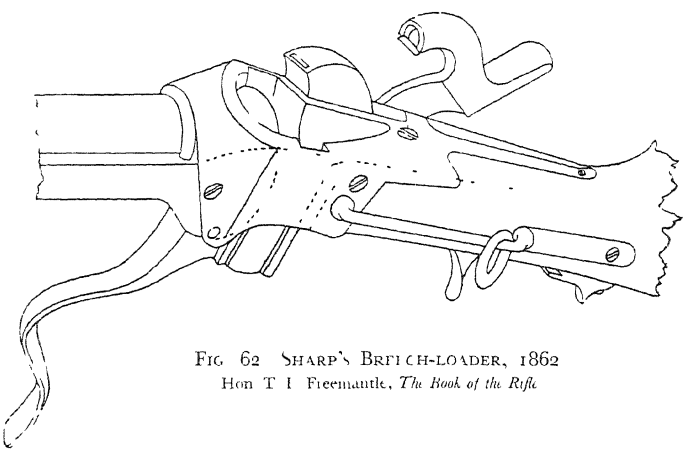


FIG 62 SHARP'S BRITCH-LOADER, 1862
Hon T I Fremantle, *The Book of the Rifle*

into the cavity in the bullet, thereby expanding the base to fit the grooves of the rifle. The bullet, together with Minié's rifle, were submitted to the British Government, and in 1851 it

[1] *Views and Opinions of Brigadier-General John Jacob*, edited by Captain L. Pelly (1858) Alexander Shand, *Life of General John Jacob* (1900).

was accepted, the inventor receiving £20,000. Eventually the bullet was improved by Mr Metford, assisted by Mr Pritchett, of the Small Arms Factory, and the Minie rifle was issued to some regiments in the Crimea With some alterations this became the Enfield rifle of 1855 and replaced the Minié, Mr Pritchett only receiving £1000 for the bullet.[1]

The following are the measurements of the three-groove Enfield rifle musket of 1855: weight with bayonet, 9 pounds 3 ounces, length of barrel, 3 feet 3 inches, calibre 577 inch; sighted up to 800 yards. A proof of the merits of the new rifle is recorded by Hans

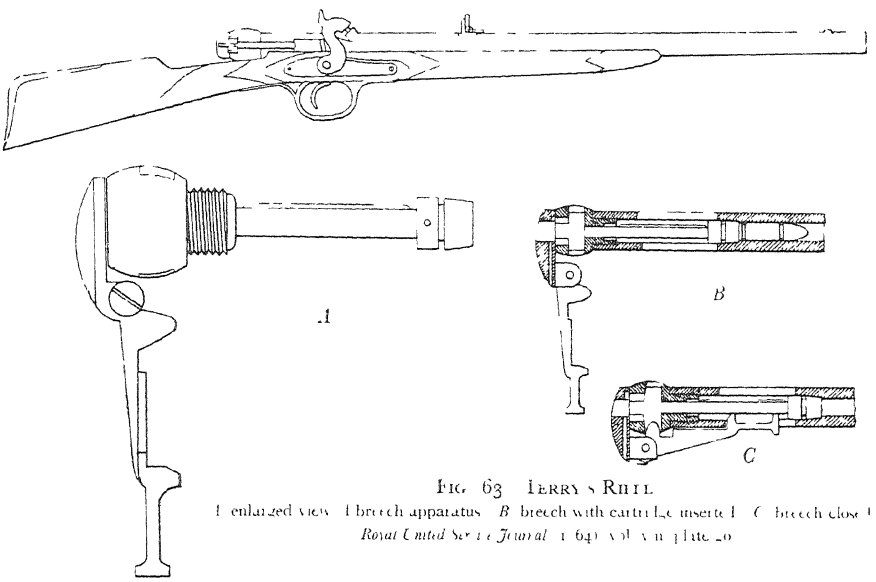


FIG. 63 JERRY'S RIFLE
A enlarged view of breech apparatus B breech with cartridge inserted C breech closed
Royal United Service Journal 1864 vol. viii plate 20

Busk in the year 1860. A full-size target was set up, representing a nine-pounder gun with horses and men. A party of thirty volunteers at 800 yards hit every man and horse several times in five minutes.[2]

From now onward the "battle of the rifling" raged, all the experts stressing the advantages of their grooving, the number of turns, and the form of the bullet Whitworth (afterwards Sir Joseph) proposed a hexagonal bore and bullet, and obtained a grant of £12,000 for his expenses in experimenting Westley-Richards, Lancaster, and Wilkinson put forward other suggestions. But none of them was perfect—indeed, Whitworth's rifle fouled so quickly that a scraper had to be used to clean the bore During this time all European armies were experimenting with breech-loaders, and as a matter of self-defence the British Government had to follow suit.

As early as 1848 the Prussians had adopted the breech-loading 'Needle' gun and used it with great effect in 1866 and 1870 Meanwhile all gun-makers had been experimenting with breech-loaders.[3] Britain, America, and Belgium submitted respectively the following breech-loaders. Sharp (U.S.A.), with falling breech actuated by the trigger-guard as a lever (Fig 62). According to tradition this gun was the origin of the "sharpshooters"[4]

[1] *Treatise on Military Small Arms* p 205
[2] *Hand-book for Hythe* (1860). p 96
[3] The earliest British patent was taken out by Wright and Byrne (No 1003), 1772.
[4] "Sharpshooters" are mentioned in the *Army List* (Volunteers) (1805)

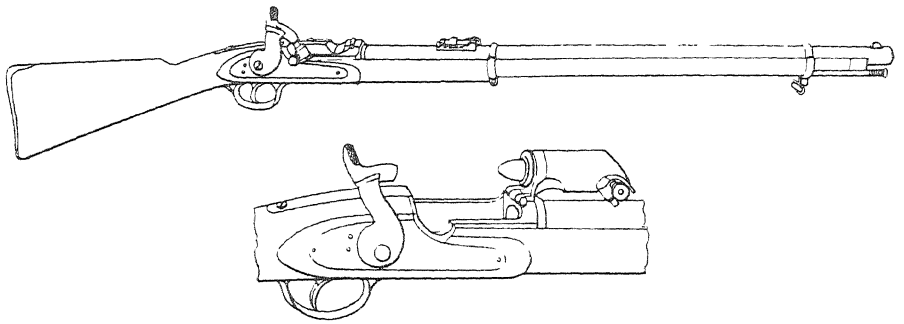


FIG 64 MONT STORMS RIFLE 1853
The lower illustration shows the breech closed with a cartridge in the chamber

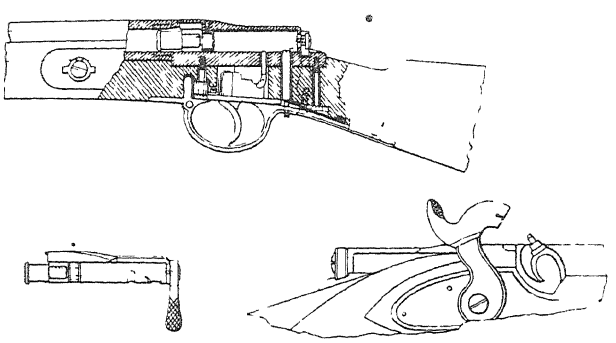


FIG 65 GREEN'S RIFLE, 1860
The two lower illustrations show the piston or bolt and the breech closed

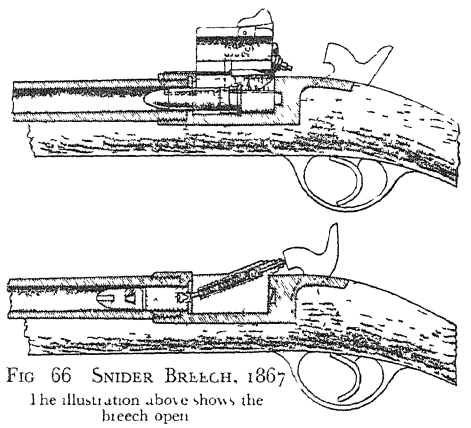


FIG 66 SNIDER BREECH, 1867
The illustration above shows the breech open

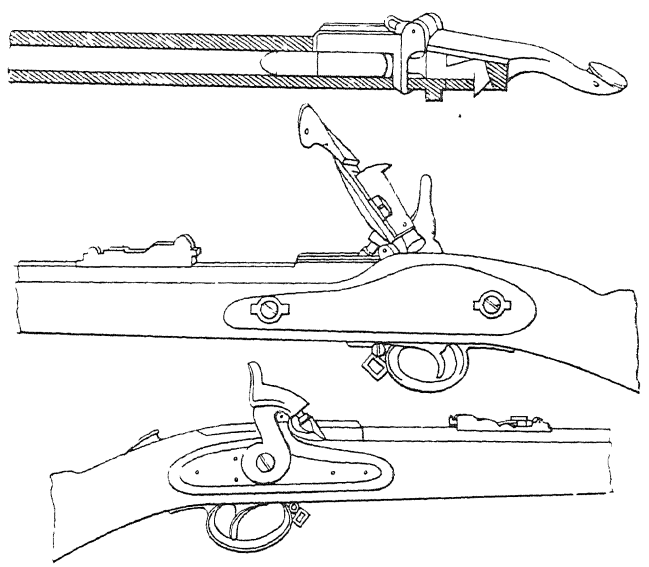


FIG 67 WESTLEY-RICHARDS RIFLE, 1861
The illustrations above show the breech closed, with a cartridge inserted and the breech open
Royal United Service Journal (1864, vol VIII, plate 20

Pat. 14052—1852)[1]; Terry, 1856; Green, simple bolt action (Pat. 2002—1862); Mont Storm (Belgian), hinged breech-block opening forward (Pat 708—1865), Greener, barrel sliding forward to load, the breech being raised (Pat 2693—1854), Westley-Richards, hinged breech-block opening forward (Pat 633—1858)—all of which were issued between the years 1857 and 1863 to certain cavalry units for test and experiment (Figs 62–67), but were declared obsolete in 1868. The Government, as has often been the case, was economically minded, and in 1864 formed a committee to deal with the matter The desideratum seems to have been to produce a breech-loader which could be made by adapting the muzzle-loading Enfield rifle barrel. Over fifty different patterns were examined, and eventually the breech mechanism known as the "Snider" was adopted in 1866 (Fig 66) Jacob Snider, a Dutch-American wine merchant with a mechanical turn of mind, produced, probably quite unconsciously, a breech-block almost identical with that found on two wheel-lock carbines marked "H R 1537" that were made for Henry VIII and are now in the Tower of London Armouries.[2] As was the case with Alexander Forsyth, Snider never lived to see his breech-loader issued to the army, for he died in 1866 and enjoyed no financial results of his invention

The illustrations (Fig. 66) show clearly how the mechanism was operated. There were a few unsatisfactory details which had to be remedied. Firstly, the breech-block was opened and closed by a fixed thumb flange with no locking arrangement. This had to be rectified, as occasionally the breech flew open, with dangerous effect on the rifleman. The thumb flange was therefore replaced by a spring-locking flange Secondly, the cartridge used was not completely gas-tight, a fault which was remedied by Colonel Boxer, a solid drawn brass cartridge being used in place of the spirally twisted brass cartridge. The third objection was that the ejector was faulty, and it was necessary to pick the cartridge out by hand or turn the rifle sideways to let it drop out As it was adapted from the Enfield rifle the measurements were the same, but the addition of the Snider breech brought the weight up to 9 pounds 12 ounces.

The Snider was at best a makeshift, and in the same year in which it was adopted, 1866, a new committee was formed to consider what improvements ought to be made. About one hundred and twenty arms and forty-nine types of ammunition were submitted, and in 1867 additional arms were sent in. As a result, in 1869 the committee reported that the best combination of these was the breech mechanism of Mr Martini's combined with Mr Henry's barrel and "Boxer" ammunition[3] (Fig. 68).

Nine weapons were in the final trial, but no first prize was awarded. Mr Henry received second prize for his rifling and Martini, who submitted a breech action, came seventh on the list.

Friedrich von Martini was an Austrian who in 1868 patented his falling breech (Patent 2035) based on that of the American, Peabody, who had produced a similar breech in 1865 (Patent 1092). At a later date Martini started a lace and embroidery factory at Witte am Rhein.

Alexander Henry (1828–94) was a gunsmith of Edinburgh. He was an enthusiastic rifleman and the story goes that, when the great Volunteer movement started in 1859, he sat up all night in order to be the first volunteer enrolled in Edinburgh. Mr Henry overcame the fouling in a small-bore rifle with a new bullet of which the Treatise of 1888 (page

[1] W O Smith, *The Sharps Rifle* (U S A, 1943)
[2] *Inventory and Survey of the Armouries of the Tower*, vol. II, p 331
[3] *Treatise on Military Small Arms*, p 213

1131 states that "We are indebted to his skill and perseverance for the small-bore military breach-loader"

The Martini breech consists of a block which swings on a pivot, passing through the back of the body, actuated by a lever which forms the trigger guard. On the lowering of the lever the breech-block falls and the extractors come into play, throwing out the cartridge. From the soldier's point of view the Martini-Henry had one serious fault in that it recoiled with unexpected force. Lord Cottesloe writes

> The 'kick' of this rifle was a terror to the unfortunate recruit who for the first time experienced its violence There were few men who did not find a comparatively small number of

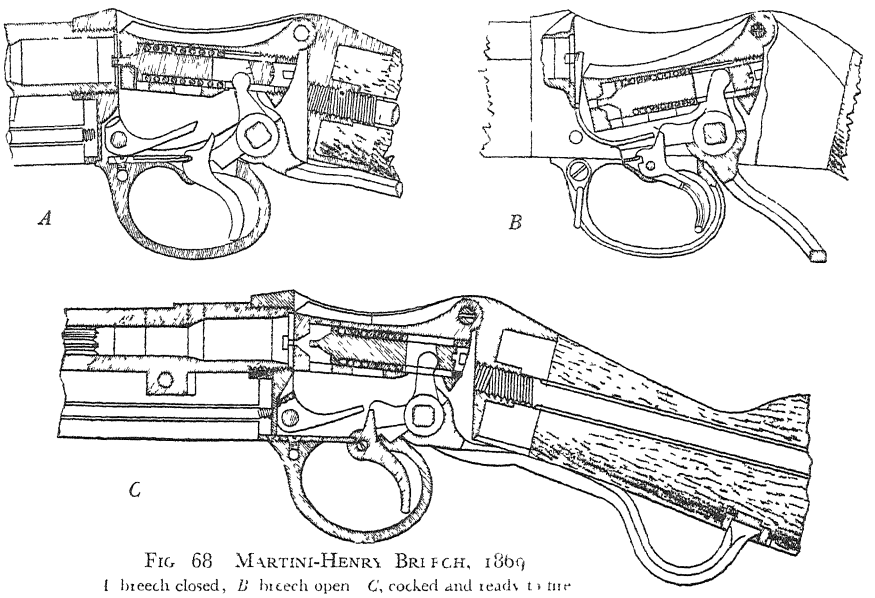


FIG 68 MARTINI-HENRY BREECH, 1869
A breech closed, *B* breech open *C*, cocked and ready to fire
Treatise on Military Small Arms (1838)

> shots fired during the day were enough to take the edge off the accuracy of their shooting. Many were the bruised shoulders for which the rifle was responsible.[1]

The following are the particulars of the Martini-Henry rifle. Weight $8\frac{3}{4}$ pounds, bore ·45 inch, grooves 7, sighted to 1450 yards. This rifle was adopted in February 1871. In 1886 the bore of ·45 inch was altered to ·402 inch, the Henry rifling of 7 grooves being altered to a form of rifling suggested by Mr Metford.[2] Here it may not be out of place to describe briefly some of the work of Mr Metford, whose name is a household word among all rifle enthusiasts.

William Ellis Metford (1825–99) was employed on the Wilts, Somerset, and Weymouth Railway in 1846–50, and held an appointment on the East India Railway during 1857–58. He was a born inventor and designed an improved theodolite, a new form of level for telescopes and numerous other mechanical contrivances. Arriving in India in 1857 at the time of the Mutiny, at Monghyr, on the Ganges, where he was stationed, he practically took charge of a city of sixty thousand inhabitants, in spite of orders from the railway company to return to Calcutta. The post had to be defended, and Metford supervised

[1] T F. Fremantle, *The Book of the Rifle*, p 95
Text Book of Small Arms 1909, p 18

the fortifications for over six weeks. When English troops arrived in August, after Metford and his wife had kept nightly watch for seven weeks, sometimes for a whole night, the British officers insisted on taking him and his wife to Bhagulpore, but he would not rest, and returned to Monghyr. At last, broken in health, he returned to England in 1858. Here he busied himself with astronomical and other inventions. But before this, in 1853, he had produced a hollow based bullet in conjunction with Mr Pritchett, who has been referred to above. As often happens in such cases, Metford allowed Pritchett to take the credit and the £1000 which the Government awarded to him. In 1865 he produced and used a match rifle, followed in 1871 by a breech-loader Finally, in 1888, his rifling was combined with the bolt action of Lee in the Lee-Metford magazine rifle His was a personality of great charm, patient in ill health, courageous in times of danger, and always

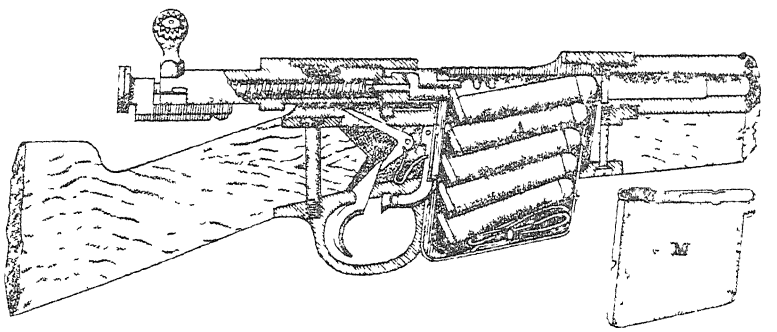


FIG. 69 LEE-METFORD RIFLE, 1888
M magazine
Treatise on Military Small Arms, 1888

deeply religious These extracts from the Proceedings of the Institution of Civil Engineers, May, 1900, very rightly end with the words, "he has left in the world of those interested in rifle work a gap which there is none to fill"

With Metford we come to the first magazine rifle issued to the British Army in 1889. Metford's rifling was seven grooves with a bore ·303. The bolt action was designed by Lee, a Scottish watchmaker domiciled in Canada and America (Fig 69) This rifle was further improved in certain details and to Marks I, II, and II* in the last pattern the important addition of a safety catch to the bolt was added [1] The sights ranged from 500 to 2000 yards In 1895 the Enfield rifling was substituted for that of Metford, and the Lee-Enfield is with us to-day with many improvements on the original pattern

As has been pointed out, these notes on British arms are intended to be merely introductory to an interesting and fascinating study, the technical side of which cannot possibly be dealt with in the confines of one volume. Those who wish to dig more deeply cannot do better than consult *The Book of the Rifle*, by the Hon. T. F Fremantle (now Lord Cottesloe), and *Rifles and Ammunition*, by H. Ommundsen and E. H Robinson

In 1927 a committee was formed by the War Office, with Lord Cottesloe as chairman, to survey all the Government collections of obsolete small arms In 1938, with the close and cordial co-operation of the officers of the Small Arms Factory at Enfield, the Rotunda Museum, Woolwich, the Ordnance Store at Weedon, the Imperial War Museum, and the Science Museum, a collection was formed in the Armouries of the Tower of London of

[1] E Marks, *Evolution of Small Arms* (1898), pp 86–95

several hundred service weapons, sectioned arms, patent specifications, and books of reference, which the serious student can examine and consult without interruption from museum visitors This collection was considerably added to by the generous assistance of the directors of the Wellcome Historical Medical Museum, in Euston Road, who deposited nearly one hundred examples of experimental and other pieces.

Grenades

The grenade may be said to have been evolved from the incendiary arrow, and, with the advent of cannon and firearms, was designed as a portable form of the explosive shell of the sixteenth century We first hear of the grenadier, a new branch of the infantry, from John Evelyn,[1] who writes under the date of June 29, 1678. "Now were brought into service a new sort of soldiers called Granadiers who were dextrous in throwing hand granados . they had furred caps which made them look very fierce." J Blackwell, Adjutant to the Honourable Artillery Company, gives the words of command to grenadiers [2] "Handle your matches, open your fuze [with the teeth], guard your fuze, blow your match, fire and throw your grenade" (Fig 19). The grenade was given up by the grenadiers of the infantry in 1714, but this exercise is still followed with appropriate pantomime action on Guest Nights in the Honourable Artillery Company.

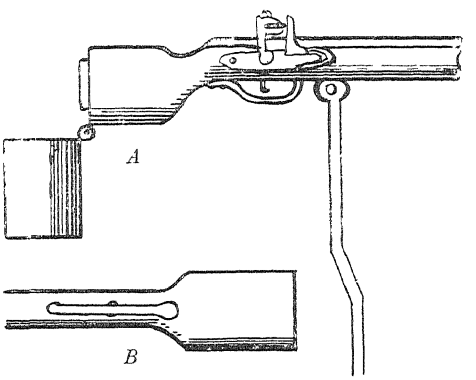


FIG 70 GRENADE MUSKETS, CIRCA 1740

In order to increase the range, grenades were projected from flint-lock muskets, one type having a cup at the muzzle (*B*), the grenade being discharged by the powder charge in the barrel. Another had a hinged cup at the butt with a separate charge, the vent communicating with the pan being closed by a spring trap (*A*). Pivoted to the stock is a hinged steel rest. There are several examples of this weapon in the Tower Armouries. One is marked "J.R" (*circa* 1680), and the remainder 1728, 1739, 1740, 1744, 1747 (Fig 70).

The danger in using these cumbersome contrivances will be obvious when it is realized that the grenade fuze was lit before the musket could be brought to the 'present,' and the uncertainty of the flint lock must have increased that danger. The grenade was given up as a weapon about the end of the eighteenth century, and it was not till the Russo-Japanese war of 1904–5 that it was again brought into use. In the war of 1914–18 both hand grenades and rifle grenades were employed, the Mills hand-grenade being the most popular and the Hales, mounted on a stick, being used with the rifle [3]

The Pistol

When once the original cannon had been reduced in size and had become the hand-gun, and later the match-lock, it was but natural that the mounted man should be anxious to

[1] *Diary* (1871 edition), p 400
[2] *Compendium of Military Discipline* (1729).
[3] *Text Book of Small Arms* (1929)

be armed with the same weapon as the foot-soldier It is obvious that this arm would be too heavy and inconvenient to be carried on a horse, whose essential was to provide rapid movement either on the march or in action The illustration, Fig. 71, shows how some attempt was made to use the cumbersome hand-gun or, at any rate, how the artist of the

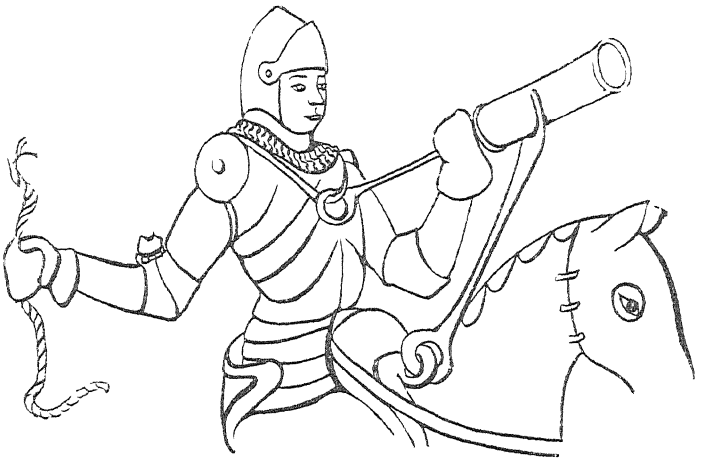


Fig 71 Mounted Hand-gunner, Thirteenth Century
Cabinet des Estampes de Dresden

fifteenth century recorded it. More than a hundred years later Sir John Smythe states that he had seen musketeers on horseback with long musket rests of steel, but these were probably dragoons who fought normally on foot. The name dragoon is derived from the 'Dragon'—a short musket with a snaphance lock—which they carried Eventually the pistol was evolved, the name being generally considered to be derived from Pistoia or Pistolla, a city in Italy famous for producing weapons.

Fig 72. Wheel-lock Pistol
circa 1550
Hefner, *Trachtenbuch*

The pistol of the sixteenth century ended either in a miniature gun stock or in a large bulbous pommel, the latter type being particularly favoured in Saxony (Fig. 72). The lock was generally the wheel-lock. For the rich man these pistols were highly decorated with ornate and complicated locks, but for the ordinary trooper they were of necessity simpler and cheaper. Now the horseman suffered under the same severe disadvantage as the foot-soldier, in that it took so long to load and prime his piece that he had to retire for the operation. The mounted man generally carried two pistols in holsters at the saddlebow, which he discharged at the gallop as soon as he was near the close ranks of the enemy's infantry, more with the idea of producing a moral effect than of any certainty of achieving a practical result. His squadron then wheeled right or left and retired, their place being taken by another squadron, and so on until the whole regiment had been in action, each

squadron reloading, priming, winding up the wheel, or, in later days, readjusting the flint or renewing the copper cap—whichever in the course of centuries was the lock used in the Army. Popular writers have described cavalry of this period charging and, after firing, throwing their pistols at the opposing infantry; needless to say, this is absurd, as these weapons were costly and extremely difficult to make. The pistol itself was a non-essential weapon, the sword being the main arm of the cavalry. In later years, when the flint lock and the percussion lock were adopted, the pistol became a cheaper proposition, but, like the musket of the foot-soldier, it was turned out by so many gunmakers that there was no attempt at standardization. The calibres of cavalry pistols in the Tower Armouries range from ·57 inch to ·75 inch, and it was not till 1857–60 that a standard calibre (·75) was ordered. When not carried in holsters the pistol had a steel tongue on the inside which was clipped into the belt. At first the ramrod was loose and, as may be readily imagined, was often lost in action. To remedy this, the famous gunsmith, Ezekiel Baker, produced in 1822 a steel ramrod attached to the stock by a swivel, which was generally adopted for cavalry pistols. Between the years 1835 and 1847 Samuel Colt took out several patents for a revolver pistol. Whether he had heard of the revolver guns of the sixteenth century or whether he had seen the patent specifications of Puckle mentioned at page 85 we have

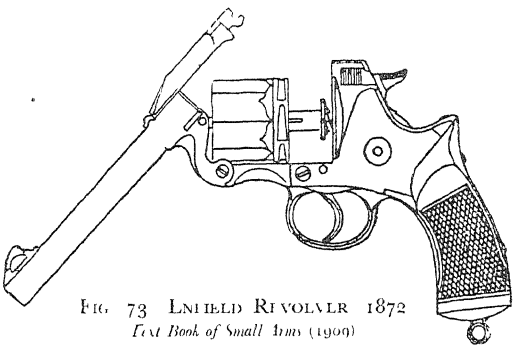


FIG. 73 ENFIELD REVOLVER 1872
Text Book of Small Arms (1900)

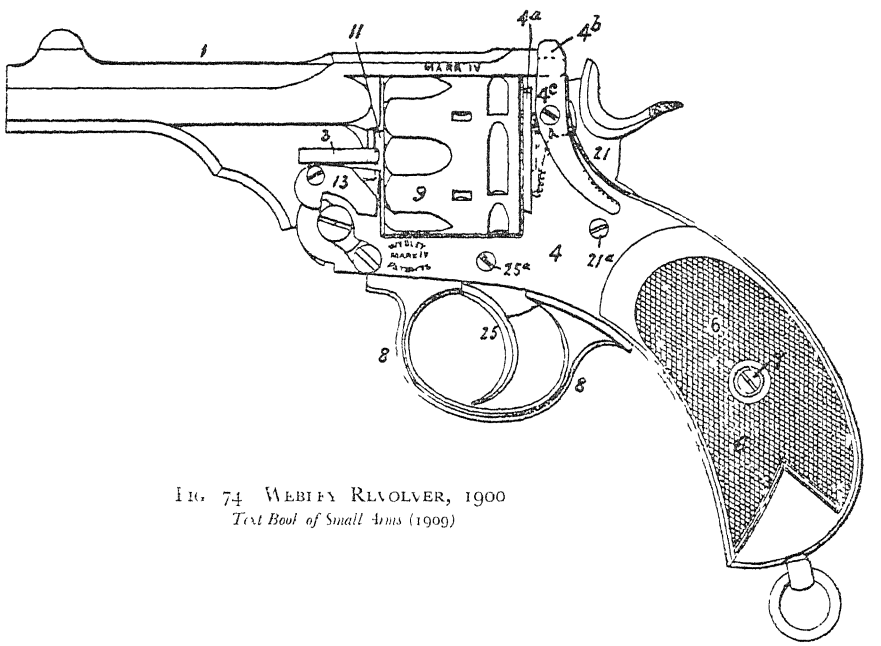


FIG. 74 WEBLEY REVOLVER, 1900
Text Book of Small Arms (1909)

no certain information, but if he had no knowledge of these experiments it is remarkable that he should have evolved an entirely new weapon. On coming to England in 1851

he set up a factory at Pimlico for making revolvers, but the War Office was more interested in the production of Enfield rifles than in American revolvers. The result was that, except for a few hundred sent to India, the Colt revolver was not generally adopted for the British Army. The English gunsmiths, however, saw a great future for this weapon. Dean and Adams, Webley, Tranter, Cooper, and others all produced various types based on the principle of the revolving chamber—needless to say, with percussion locks.

The year that Colt came over to England, 1851, Adams submitted to the Small Arms Committee a 450-475 revolver which was approved, but we hear nothing of this till 1863, when the first *Text Book of Small Arms* was published, which notes the Dean and Adams 436 and the Colt 358 "as now used in the British Army." These were followed in 1872 by the Enfield revolver ·442 made in the Government Small Arms factory (Fig. 73). This did not achieve popularity, one of the chief objections to it being that, as with the Snider, the cartridges were not ejected but had to be shaken out (Fig. 73). The *Text Book* of 1904 states that "pistols have now emerged from the experimental stage." Eventually *circa* 1893 the Enfield was superseded by the Webley Mark IV revolver ·441 inch, which first appears in the Dress Regulations of 1900 as the arm for infantry officers (Fig. 74). From that date up to the present day the Webley has been the service weapon, going through the Marks I, II, III, IV, V, and VI, each new Mark embodying certain improvements. In all the above revolvers the chambers are turned by the action of cocking the piece by the trigger. There is one interesting exception in the Webley-Fosbery 455 revolver, invented by General G. F. Fosbery, V.C. This was issued about the year 1900. Here the piece is cocked for the first shot; after this the recoil recocks and at the same time rotates the chamber. It is therefore necessary to fire with a straight stiff arm, for the force of the recoil would be reduced if the arm were bent. Some of these revolvers were used by officers in the First World War, but they never achieved much popularity.

Though practically every European army has adopted the automatic self-loader pistol, the British Army has always adhered to the revolver. The *Text Books* of 1909 and 1929 tabulate the advantages of the automatic.

(1) The rapidity of fire.
(2) Rapidity of recharging. The magazine can be refilled by means of a charger more quickly than a revolver can be reloaded.
(3) It carried more cartridges than a revolver.
(4) There is no escape of gas.
(5) The shock of recoil is reduced.

Against these are placed its disadvantages:

(*a*) The automatic is more complicated.
(*b*) The pistol must always be kept very clean and well lubricated.
(*c*) The mechanism must be in perfect order as there is no time to rectify a jam.
(*d*) The principle object is to inflict a paralysing wound, and therefore a heavy bullet of large diameter is essential. [The automatic has a much reduced bore about .3 inch and therefore less wounding power.]
(*e*) The revolver is infinitely more reliable.

As has been noted at page 46, the officer of to-day has no use for his sword except for ceremonial, and depends entirely on his pistol. It is therefore of interest to find that after

exhaustive experiments extending over many years the British revolver is preferred to the less reliable automatic.

Ammunition

In order to rectify the cumbersome process of loading from wooden charge-holders and priming from a primer, or horn, mentioned at page 53, a cartridge was produced in the latter part of the seventeenth century. Lord Orrery writes in 1677,[1] "I am, after a long experience, an enemy to the use of the bandolier and a great approver of cartridges, for the musketeer hath no more to do than to bite off the paper that contains the charge," —a form of cartridge that lasted for over a hundred and fifty years. In 1777 William Rawle, who took out a patent for cartridge-containers, states that when the end is bitten off the powder is poured into the barrel and paper and bullet rammed home, the paper serving as a wad. To obviate the inconvenience of using coarse "corne" powder for the charge and fine "serpentine" powder for the priming a fine-grain powder was used in the eighteenth century which, on loading, passed through the vent into the pan, the cover protecting it from wind and rain (Fig. 54).[2] With the advent of the percussion system the paper cartridge continued in use lubricated with tallow and hog's or cow's fat. This is considered to have been one of the reasons for the Indian Mutiny, as the sepoy, for reasons of caste, objected to bite off the end.

With the adoption of the Snider breech-loader a cartridge of coiled brass, the base of which contained the percussion-cap, was patented by Colonel Boxer in 1866 (No. 137), and was used later for the Martini-Henry till 1888, when the solid brass cartridge was introduced, which, with certain improvements, is with us to-day.[3]

There is one detail, however, which for obvious reasons is not specifically mentioned in any official handbook—the 'Dum-dum' bullet over which controversy raged in the Press and in Parliament during the last years of the nineteenth century. In the Chitral campaign of 1895 it was found that the Lee-Metford bullet perforated, but did not stop, the wild tribesmen in their charge, indeed, it was stated that two or three men had been perforated consecutively by one bullet which, however, had failed to stop them. Now, the main function of the firearm is to put the enemy out of action; and this the Lee-Metford ·303 failed to do. While endeavouring to produce a stopping bullet Captain Clay, of the ammunition factory at Dum-dum, found that by slitting the nickel casing of the bullet the lead filling spread in the wound and effectively halted the oncoming man, but at the same time aggravated the wound very considerably. The Declaration of St Petersburg of 1868, which had been signed by all the European Powers, had forbidden the use of explosive bullets charged with fulminating matter; it had laid down that "the aim of the soldier is to put out of action the largest number of men, but not by arms which would uselessly aggravate their sufferings." It was generally considered at the time of its invention that the Dum-dum bullet did not offend the letter of the Declaration, nevertheless, experiments were made to produce a more humane man-stopping bullet. This was achieved to a certain extent with the Mark III bullet about the year 1897.[4]

[1] *The Art of Warre*, p. 178.
[2] *Treatise on Military Small Arms* (1888), p. 100.
[3] *Loc. cit.*, p. 80.
[4] E. Marks, *Evolution of Small Arms* (1898), p. 109.

CHAPTER V

THE BAYONET

THE derivation of the word 'bayonet' may be left to the philologists and lexicographers, who have argued at some length in favour of or against Bayonne—a city famous in the sixteenth century for knives and daggers—or *baionet*, the cross-bow man who carried a great knife. Suffice it to say that from Randle Cotgrave[1] in 1611 to Akerman[2] and Sibbald Scott[3] in 1860-63, no writer has proved his point, and has been obliged to compromise with a *non possumus*.

It is necessary in the first place to inquire why the bayonet was ever introduced and why, for a long period, such an entirely unserviceable weapon should have survived all over Europe.

In the seventeenth century the musketeer was encumbered with a musket weighing twelve pounds or more, musket-rest, bandoliers, bullet-bag, match, priming-horn, and sword, to say nothing of a great hat and full-skirted coat (Fig. 19). The process of reloading his match-lock piece was so lengthy, entailing so many operations, that he had to retire under the eighteen-foot pikes of the infantry as a defence against cavalry. These pikes were, in many respects, unpractical weapons, for their extreme length was a serious inconvenience in drill and manœuvres, and when opposed to a determined charge of heavy cavalry there was a risk of several pikes being broken and the whole line being thrown into confusion.

The military mind therefore, then, as now, economical, endeavoured to combine the functions of musketeer and pikeman, and to produce a weapon which would serve both purposes.

The earliest example of this two-piece weapon is to be found in Henry VIII's three-barrel, match-fired mace in the Tower, from the front of which a long spear-point protrudes, and although it was many years before this idea was developed it may fairly be claimed to be the prototype of the bayonet.

The several changes in design that have taken place overlap each other to such an extent that it will be simpler to deal with them under separate headings.

The Pike as a Bayonet

In 1625, when Charles I endeavoured, with no success, to revive the practice of archery, one William Neade published a pamphlet, entitled *Double-armed Man*, wherein he suggested that the archer should have a half-pike so attached to his bow that it could be used in emergency against cavalry.

However, nothing came of the project, and no organized troops were ever armed with this combination weapon. As the musket increased in popularity in the Army so the pike was gradually discarded, though it was not entirely abandoned until 1702, when all pikes were returned and muskets issued in their place.[4] The first account of a combined musket

[1] *French-English Dictionary* (1632 edition)
[2] *Archæologia* (1860)
[3] "Lecture on the Bayonet," in *Journal of the Royal United Service Institution*, vol. VII (1863), pp. 333-348.
[4] P.R.O., W.O. 26/11, 272.

and pike is to be found in Gervase Markham's *Souldier's Accidence* (1625). The author writes. "They [the musketeers] shall have rests of ash with iron pikes at the nether end and half hoops of iron about to rest the musket on" (Fig. 19). This combination of rest and pike was a development of the "swyne feather," or hand-palisado, which early dragoons carried as a defence against cavalry.[1]

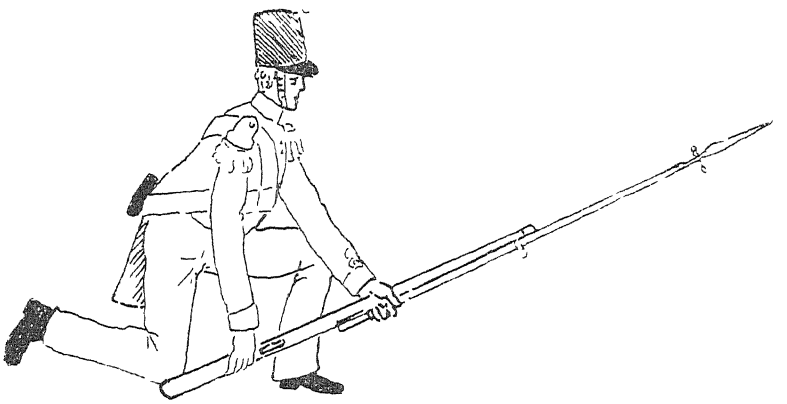


FIG. 75 PIKE BAYONET, 1850

In 1639 William Barriffe published his *Militarie Discipline or the Young Artillery-man*, in which he records another of these attempts to utilize the pike, as follows:

> Having considered the danger of the musketeer and how he is unable to resist the horse after he hath poured forth his piece without hee bee sheltered either by some naturall or artificial defence . divers captains and souldiers have often been trying conclusions to make the musketter as well defensive as offensive. Some by unscrewing the heads of their rests and then screwing their rests into the muzzle of the muskett.

Evidently the "divers captains and souldiers" reported unfavourably on this fantastic project, for not only would the unscrewing of the rest-head and the insertion of the staff into the musket take time, but the combined weapon would weigh from thirteen to fifteen pounds, and the removal of the staff and its readjustment for subsequent firing would also be a lengthy process. It is not surprising, therefore, that Barriffe adds, "but this proved to be tedious and troublesome." Next we find what can only be considered to be a 'throw back' of over a hundred years to primitive conditions. In the Tower and in the Royal United Service Museum are two flint-lock muskets, the first marked "Mortimer 1797" and the second "Nicholas," of about the same date. The stocks are fitted with two rings in which are inserted pikes of very similar design to that ordered for sergeants in 1800. But what is more surprising still is to find a lithograph in the United Service Museum, showing a man using this weapon (Fig. 75) while behind him are four men standing with their muskets at the 'present' and their pikes stuck into the ground. The print is undated, but the fact that the muskets are percussion would suggest the earliest date as 1840; against this must be placed the fact that the sergeant's pike was given up in 1830, though the artillery claim to have used it until 1845, a date which fits in more nearly with the uniform depicted.

Another puzzle is: are all these men sergeants, or does the print depict some experimental

[2] Also mentioned as "useful and convenient" by Sir James Turner (*Pallas Armata* (1683), p 175)

drill? In any case, it would be of interest to know why a contrivance devised in 1707 should have been revived in the second quarter of the nineteenth century when the bayonet had become a standard weapon.

FIG. 76
PLUG
BAYONET
1680

There is a small book in the library of the Royal United Service Institution by Major-General Sir William Morison, K.C.B., entitled *Notes Explanatory of the Advantages of the Pike-musket and Pike-rifle* ("not published," 1850). The author stresses the importance of this weapon as a rest for sharpshooters, as "the soldier can fire again and again at the same level." He states that "in several important respects an efficient pike is at least formidable but more useful than the bayonet." He gives the weight of pike and bayonet as 11 pounds 4 ounces, as compared with 12 pounds in 1800. There are eleven plates showing the uses of the pike as a rest and a bayonet, and troops in hollow square receiving cavalry. In 1845 Morison submitted his patterns to the Ordnance Committee, and on June 3 he was informed that they "would be formidable weapons in desultory or irregular warfare, but are not suitable for the public service generally." He was ordered to deposit his patterns with the Inspector of Small Arms at the Tower. There is still one of these in the Armouries, and another is to be found in the Royal United Service Museum, both of which are flint-locks with the pike and fittings added.

The Plug Bayonet

While the "divers captains and souldiers" were trying to utilize the pike, possibly for economical reasons pressed upon them by a parsimonious Ordnance and Treasury, the hunting man took a hand in the matter. An essential part of the hunter's equipment was a short, broad-bladed knife, the grip of which, in emergency, could be fitted into the barrel of the musket. These are to be found in collections, and are generally of Spanish make. There is one in the Tower by Manuel Monsalve, one at Stockholm, and another is illustrated in Boheim's *Waffenkunde*. They are all of the seventeenth century.

De Puységur records, under the date 1647, the fact that soldiers carried bayonets with handles and blades both twelve inches long, adapted for putting in the barrels of the fusils to defend themselves when they were attacked after firing.[1] He does not suggest that these were new weapons, but mentions them as part of the recognized equipment of the musketeer. It is only when we arrive at the year 1660 that we find the hunting-knife referred to in a proclamation of Louis XIV.[2] "La frequence des accidents qui arrivent journellement par l'usage des baionnettes et couteaux . . . qui se mettent au bout des fusils de chasse ou se portent dans la poche." De Puységur suggests[3] that a "couteau de chasse" is preferable to a sword.

These knives, or daggers, are sometimes found with no guard, but more often with small quillons (Figs. 76, 77). The grip is always tapered, as the calibres of muskets varied considerably. There were several drawbacks to this two-purpose weapon. It was quite impossible to use it with the twelve-pound, or heavier, match-lock musket, and it was only the introduction of the fusil, a lighter musket, which made the plug bayonet more or less practical. The tapered grip, made to fit all varieties of calibre, had no fixing contrivance, and the result

[1] Seigneur de Puysegur, *Memoires de Jacques de Chastenet* (1747), II, 306.
[2] Favé, *Etudes sur le passe et l'avenir de l'Artillerie*, IV, 16.
[3] *Art de la Guerre*, I, 220.

of this was that if the bayonet were fixed too firmly it might be difficult to unfix it when it was necessary to load and fire again, if it were too loose it might either drop out or be left in the body of the opponent. Finally, the fixing of bayonets proclaimed to the enemy that the muskets were not loaded. Under a Warrant of Charles II, dated April 2, 1672, it is ordered that "twelve troops of the new Regiment of Dragoons shall carry matchlock Muskets and Bayonets, or Great knives"[1] Sir James Turner, however, is a supporter of the plug bayonet, for under the date 1670 he writes.[2]

> When musketeers have spent their powder, and come to blows, the butt-end of their muskets may do an enemy more hurt than despicable swords, which most musketeers wear at their sides. In such medleys knives one foot long (the haft made to fit the bore of the musket) will do more execution than either sword or butt of musket

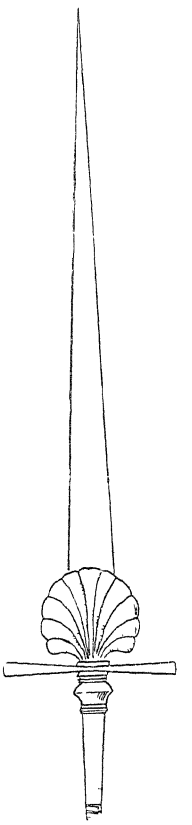


FIG. 77 PLUG BAYONET, 1680

On the other hand, Louis de Gaya,[3] in describing the equipment of the English musketeer, makes no mention of the bayonet, and adds, "quand ils ont fait la decharge du Mousquet ils se battent à Coups de Crosse [stroke of the butt]"

The earliest record of the bayonet as issued to a particular regiment is given in Cannon's history of the 7th Royal Fusiliers, raised in 1685, which includes "snap-hance musquets and Bionetts." A plug bayonet in the Tower is engraved "God Save King James the Second 1686."

The obvious solution of the difficulties of fixing would have been to standardize the bores of muskets and fusils, which ranged from 684 to ·758, but as these were made by contractors all over the country such a desideratum was impossible; indeed it was not till the first quarter of the nineteenth century that one calibre was standardized. Apparently some attempt at improvement was made in 1678, when Philip Russell was paid eight guineas on warrant signed by the Duke of Monmouth for "a new sort of bayonet,"[4] but no details are given, and no patent or protection was taken out.

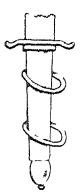


FIG. 78 RING BAYONET, 1700

The Ring Bayonet

About the year 1678 an improvement was made which de Puységur records, for he states[5] that he had seen a regiment armed with swords without guards, but in lieu thereof a brass ring, and another ring at the pommel which passed over the barrel of the fusil.

General Hugh Mackay claims this as his invention after the Battle of Killiecrankie in 1689, but he might have obtained this pattern ten years previously from France, and possibly had done so.[6]

[1] P R O, W O 55/333, p 148
[2] *Pallas Armata* (1683), p 175
[3] *Traité des Armes* (1678, new edition 1911), p 157
[4] P R O, W O 26/5, p 90
[5] *Art de la Guerre*, I, 220
[6] *Text Book of Small Arm* (1929), p 78

Grose writes[1] that

> The late Rev Mr Gostling, of Canterbury, who was extremely inquisitive respecting military affairs, told me that he remembered to have seen two horse grenadiers ride before the coach of Queen Anne, with their bayonets fixed by means of rings

The illustration given (Fig. 78) was presumably supplied by Mr Gostling, as Grose does not give its provenance. Some attempt seems to have been made to fix the ring bayonet

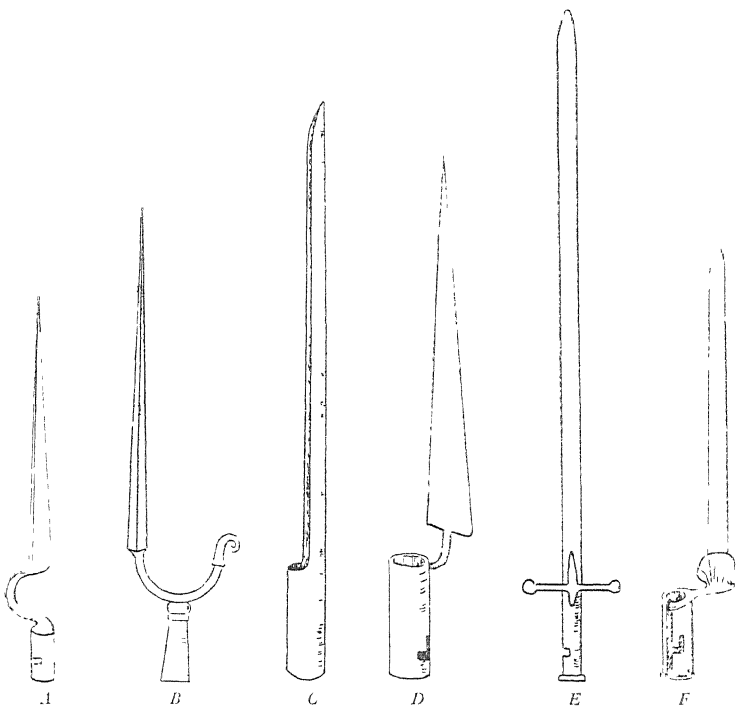


FIG 79 SOCKET BAYONETS

A, French (1740), *B*, bayonet and musket rest (*circa* 1700), *C*, gouge bayonet (*circa* 1724) *D*, bayonet (*circa* 1800), *E*, sword bayonet (*circa* 1780), *F*, split socket bayonet (*circa* 1700)

"with a screw at the hilt" by de Chaumette, in 1721, but no details are given in his patent, which will be found at the end of this chapter

The glossary at the end of the *Memoirs* of M. le Marquis de Feuquières (1737) gives: "Bayonet a short, broad dagger made with iron handles and rings that go over the muzzle of the firelock."

The Socket Bayonet

Once the ring bayonet had been adopted the simple and obvious result must have been that gunsmith, or swordsmith, or both, evolved the socket bayonet (Fig. 79). Père Daniel[2] gives an illustration of a bayonet in use about 1724 (Fig. 79*A*) In 1688 Louis XIV ordered experiments to be made with socket bayonets (*bayonettes à douilles*),[3] but during a trial before the King it was found that as the barrels of the muskets were of different sizes some of the

[1] *Military Antiquities* (1801), vol 1, p 163.
[2] De Puységur, *Art de la Guerre*, Vol 1, p 148
[3] *Histoire de la Milice Française* (1724), vol 1, p 337

bayonets fell off, and, with others, when the musket was fired the ball damaged the bayonet. Once the socket bayonet appeared, various types of blades and fixings (Fig. 79) were tried, most of these being quite unpractical. Both ring and socket bayonets laboured under the non-standardization of barrels, and therefore each bayonet had to be made to fit a certain type of musket or fusil, a serious business for the Ordnance, or the colonels of regiments, who were responsible for the supply of weapons Both plug and socket bayonets were used during the same period, for the Ordnance records in the Public Record Office show that

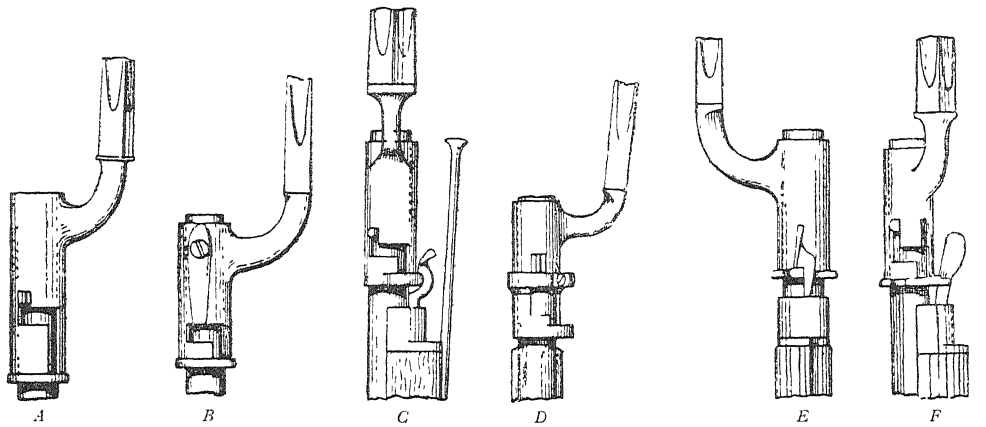


FIG 80 SOCKET BAYONETS
1, 1800, *B*, 1825, *C*, 1839, *D*, 1853, *E*, *F*, 1842
Royal United Services Journal, vol VII, plate 34

in 1704 socket bayonets were sent to Portugal, and that three thousand plug bayonets were still in store at the Tower. In 1706 the Board writes:[1]

> All the regiments raised since the disuse of pikes (1702) have provided bayonets . . . at their own charge. Few of the officers agree in the sort of bayonets fit to be used or in the manner of fixing them as may appear by the various sorts there are of them in the Army.

In order to get over the difficulty of using the same type of bayonet for different sized musket-barrels, the 'split socket' bayonet was introduced (Fig. 79*F*).

The schedule of equipment of Killigrew's Dragoons in 1706 includes "Split socket bayonets to serve over a full-bored musket." The assumption is that the socket could be enlarged or hammered close to obtain a more or less accurate fit (Fig. 79*F*).[2]

The earliest patent for a spring catch is dated 1803, under the name of J. S. Searles (No. 2744); but apparently no satisfactory locking spring had been devised as late as 1843, when it is stated that the men of the 22nd Regiment, at the battle of Meeanee, had their bayonets pulled off by the enemy[3] and had to tie them on with cord and wire. However, the War Department was moved either *propter* or *post*, for in the following year a Circular Memorandum, dated October 26, 1844, records "A new and more secure method . . . for attaching or fixing the Bayonet," and gives instructions as to the fitting of springs to the existing bayonets. Previous to this, in 1836, experiments were made with a sword bayonet, based possibly on the bayonets of the Baker and Brunswick rifles, which will be alluded to later. In this instance, two percussion muskets and two sword bayonets were

[1] PRO. WO 55/333, p 148
[2] PRO AO. 17/28, p 154.
[3] *Journal of the Royal United Service Institution*, vol. VII, p. 342.

issued to regiments stationed in Dublin, and the officers were asked to consider whether, after experiment, they were to be preferred to "the Bayonet in general use."[1] Several types of rings and springs were tried between 1825 and 1853, and at last a satisfactory locking ring was produced for the bayonet of the Enfield rifle (Fig. 80*D*). This continued in use when the Enfield was converted to the Snider principle, and when the Martini-Henry, with its small calibre, was issued the socket was 'bushed'—that is, reduced to fit the smaller barrel (Figs. 81, 82).

There was one advantage of the triangular-sectioned bayonet over the sword bayonet—it could only be used as a bayonet and could not be misused by cutting, and at worst was only employed for toasting food over a camp-fire.

In the Sudan Campaign of 1884 many of the bayonets were supplied by German firms, who favoured 'case hardening,' but as the weight of the arms supplied was above the

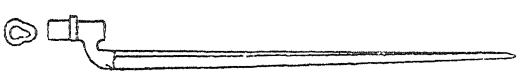


FIG. 81 MARTINI-ENFIELD 1865

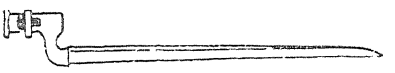


FIG. 82 MARTINI-HENRY 1870

War Office specification they were ground down, thereby removing the hard exterior and exposing the soft metal. The result of this was that the bayonet could be bent, indeed, a corkscrew might be produced from it.

The triangular bayonet ended its existence in 1888, when the Lee-Metford rifle carried the short sword-bayonet, Mark I. This brings us to the evolution of the sword bayonet, which continued side by side with the triangular weapon for the best part of a century.

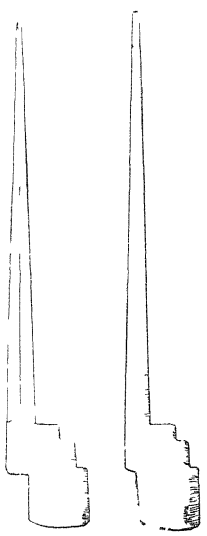


FIG. 83
EXPERIMENTAL
SOCKET BAYONETS,
1938 AND 1940

About the year 1938 experiments were made with a new bayonet based on the pattern of 1883. The new pattern had a quadrangular section, the blade about eight inches long. Shortly afterwards a bayonet of the same length was issued, but of a circular section and with a small, chisel-edged screwdriver instead of a sharp point. This was based on the Russian bayonet of the '3-line' rifle, by which the whole of the rifle could be stripped without the use of any tool. Up to the present they are both in the purely experimental stage (Fig. 83).

The Sword Bayonet

The adoption of the sword bayonet was, presumably, to combine the functions of sword and pike and thus to relieve the infantryman of the short sword, or hanger, which he carried with all his other impedimenta. The first Baker rifle of 1800 was provided with a cross-handled sword which had a locking spring in the grip, fitting over a lug at the side of the rifle barrel, and a year later a knuckle-guard was added. In 1836 the Brunswick percussion rifle carried a cross-hilted sword similar to that of the Baker rifle. Both of these fixings were good, and in no way hindered the use of the foresight. A few 'sports' in the form of light cavalry sabres, with crude bayonet fittings were to be found about the year 1804–5, but were only used in Fencibles and Light Cavalry Yeomanry regiments. Various patterns of

[1] PRO, WO. 3/131, p. 363

sword bayonets are to be found in the Tower Armouries, some of which may have been tested for military purposes, and others of lighter make are probably hunting weapons After the Brunswick sword bayonet there do not appear to have been any official issues until 1855 (Fig. 85).

There was, however, another function which was not recognized officially—namely, to cut wood, and, in later years, to open tins and cases to the detriment of the weapon, *qua* sword. The blade of the Yataghan type was fairly efficient as a sword in the days when swords were used, but its weight as a bayonet must have been a great drawback to the expert marksman.

The normal triangular bayonet weighed from thirteen to seventeen ounces, but the sword bayonet, as used with carbines, ranged from 1 pound 10 ounces for the Lancaster, 1 pound 12 ounces for the artillery, to 1 pound 15 ounces for the naval cutlass bayonet. This additional weight at the muzzle end made accurate shooting a matter of some difficulty, at any rate, the strain on the left arm and hand must have been appreciable As far as I have been able to discover, none of the early works on musketry gives any instructions on shooting with a fixed bayonet. Angelo published a pamphlet on bayonet exercise in 1849, and this was followed by a second edition issued from the Horse Guards in 1857. The later forms of sword bayonet are, for convenience of reference, tabulated under the dates of issue (Fig. 86)

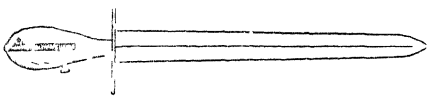
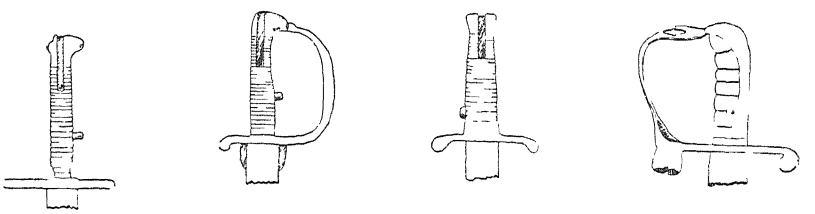


FIG. 84 SWORD BAYONET CIRCA 1800



1 B C D

FIG. 85 SWORD BAYONETS

1 and *b* for Baker rifle 1800–1802 *C*, for Brunswick rifle 1836 *D* for Yeomanry

1855. Sword bayonet for Enfield rifle and for Enfield converted to Snider, 1866. In 1873 the ring in the quillon was bushed to take the Martini-Henry barrel. It was again converted for Lee-Metford in 1891. Blade 1 foot $10\frac{3}{4}$ inches, leather chequered grip, and spring catch in pommel (Fig. 86*C*).

1856 Naval cutlass bayonet; blade 2 feet $1\frac{3}{4}$ inches, grip as above; large plate handguard.

1858. Sword bayonet for Lancaster rifle; blade, with spear point 2 feet; grip as above, quillons and pommel brass (Fig. 86*D*).

1875. Sword bayonet for artillery,[1] blade 1 foot $8\frac{1}{4}$ inches with saw-back; grip as above with narrow handguard (Fig. 87.1).

1879. Sword bayonet for artillery, as above, with blade 2 feet $1\frac{3}{4}$ inches.

1887 Sword bayonet, Mark III, for Martini-Henry rifle; blade 1 foot $6\frac{3}{8}$ inches; grip as above.

[1] In the war of 1914–18 there was an outcry in the Press over the 'barbarous brutality' of the Germans in using a sword bayonet with a saw-back This shows how ignorant even the experts were of our own equipment, for sixty years or more, if not longer, the British Army had used a precisely similar weapon.

1888. Sword bayonet. Mark I, for Lee-Metford; blade 1 foot, grip of walnut wood with spring lock in pommel, which is kidney-shaped (Fig. 86*A*).

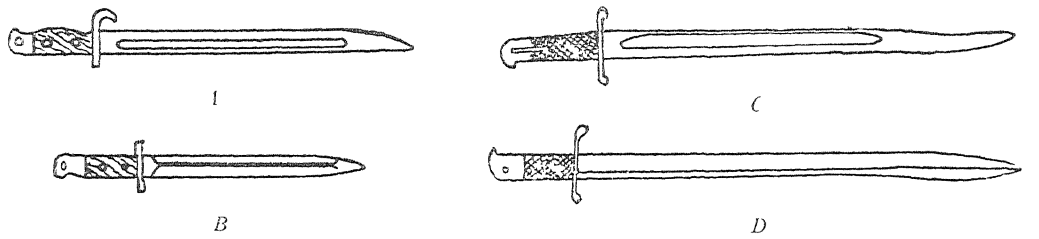


FIG. 86. SWORD BAYONETS.
A, Lee-Metford, 1907. *B*, SMLE, 1888. *C*, Snider, 1895. *D*, Lancaster, 1856.

1895. "Elcho" sword bayonet; blade with broad, swelling spear-point and saw back, 1 foot $8\frac{3}{4}$ inches; grip as above (Fig. 87*B*). This was a special pattern issued for the Ashanti War of 1895. Invented by Lord Elcho, afterwards Earl of Wemyss, it was passed by the Small Arms Committee February 8, 1871.

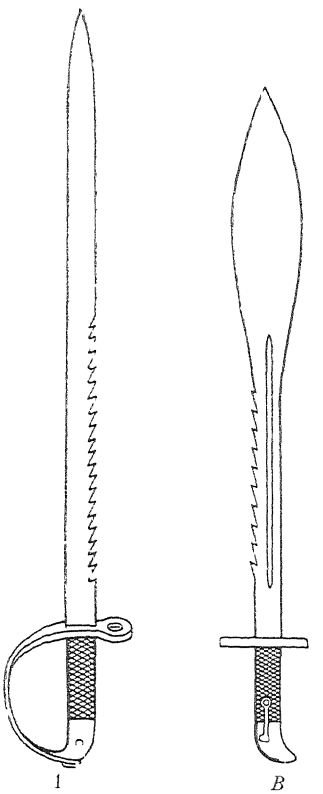


FIG. 87. SAW-BACK SWORD BAYONETS.
A, for Artillery, 1875. *B*, "Elcho" bayonet, 1871.

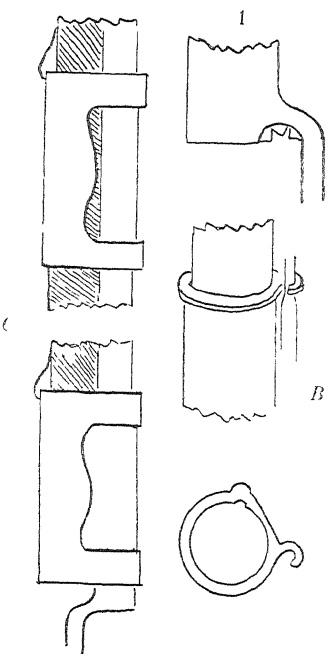


FIG. 88. EXPERIMENTAL BAYONET FIXING.
A, 1816. *B*, 1830. *C*, 1831.

1903. Sword bayonet as pattern 1888, the only difference being in the form of the pommel, which reverts to the 'beak-shape' of earlier types.

1907. Sword bayonet, Mark I, for Lee-Enfield; blade, deeply fullered, 1 foot 5 inches; grip and pommel as above. One of the quillons is turned upward towards the blade. This was intended to catch the opponent's bayonet. The turn-up was cut off in 1913 (Fig. 86*A*). The French still retain this form of hilt.

From its earliest days the bayonet has been, for the most part, worn on the left side, except in the case of the Grenadiers, who wore it on the "left front," and the Highlanders, who wore it on the "right front," towards the end of the eighteenth century In the nineteenth century it was carried on the left side, but during the present century experiments have been made of carrying the short bayonet in a long frog on the right side and, at the present time, of wearing belt and frog across the left shoulder, with the grip projecting over the shoulder—both methods having a certain amount of convenience in use to recommend them.

The following are the specifications of early bayonets in the Patent Office. They were all submitted by gunmakers, but none of them appears to have any practical value.

1721 (August 21). *No.* 434. *Isaac de Chaumette.* Swords to serve as bayonets by means of a ring at the pommel and screw at the hilt (no details given).

1803. *No.* 2744. *J. S. Searles.* The bayonet "is made to slide up and down the barrel by means of a piece of iron fixed on the barrel and is catched at each point by a spring and lever." The drawing does not explain clearly how this was done.

1808. *No.* 3155. *G. Richards.* The bayonet is made to slide outside a piece of the barrel when unfixed, with a spring to allow it to slip over the sight at the top of the piece, "which spring is to prevent their being unfixed improperly." When unfixed, the bayonet is turned over the stock. There is no drawing of this.

1816. *No.* 4031. *F. Richardson.* At the head of the bayonet socket are serrated teeth for cutting off the end of the cartridge (Fig. 88*A*)

1830. *No.* 5905. *Baron C. R. Berenger.* "In the usual method of fixing bayonets they are inconvenient if tight, and if loose they are liable to fly off." At the base of the socket is a C-shaped hook which engages on the ramrod As the ramrod is tapered it is necessary to withdraw it three-quarters of an inch before unfixing the bayonet (Fig 88*B*)

1831. *No* 6137 *A. Demondion.* A socket is made to slide over the barrel, and when the bayonet is fixed the socket slides over the bayonet socket and is held in place with a spring (Fig 88*C*).

1849. *No.* 12613. *L. A. de Chataumillard.* The bayonet is hinged to the barrel and is turned forward when fixed and retained by a spring.

1852 *No.* 519. *J. J. H. MacCarthy.* The stock is shortened, and the bayonet with cylindrical socket slides up the barrel and is locked with a spring catch.

1854. *No.* 2473. *C. Crickmay* The bayonet is hinged underneath the barrel and is held by a catch actuated by a trigger When the trigger is pulled the bayonet, controlled by a strong helical spring, flies up and is fixed by a spring catch which can be released by pressure.

CHAPTER VI

THE MACHINE-GUN

THE muzzle-loading, match- or flint-lock musket was for many years inferior, as a weapon of offence, to the long-bow, which was cheaper to manufacture and was also capable of far more 'rapid fire,' for the long process of loading and priming, and the uncertainty of flint or match, made the firearm a cumbersome weapon whose one, and possibly only, advantage in the early days was that the musketeer need not have the great physical strength of the English archer. It will, therefore, be obvious that when once the firearm was adopted inventors cast about for some means of duplicating or increasing the rate of fire In the days before patents gave legal protection the inventor withheld all details of his invention and simply claimed the results he had produced or could produce, and it is therefore almost impossible to say how these remarkable projects were carried into effect

None of these inventions seems to have been considered seriously or improved upon, and the simplest and obvious method was adopted of fixing several barrels in a frame and discharging them by match or portfire. This was known as the "Orgue," owing to its similarity to the pipes of an organ The fixed barrels were used solely for defence, and could be reloaded in comparative security behind walls or earthwork defences

They were also mounted on a wheeled carriage, often interspersed with projecting pikes or spear heads, these being known as 'Ribaudequins' or 'Orgues des bombardes.' As they could only be fired once, reloading in the open air being too hazardous, they were only employed either at the beginning of a battle, to disorganize the opposing troops, or fire was withheld till the cavalry of the enemy were within range, with the object of stampeding the horses (Figs. 136, 137). They must have been popular as early as the late fifteenth century, for illustrations of these weapons are to be found in many contemporary works on military matters, and they continued in use till well on into the seventeenth century. In 1691–93 an entry in the store lists of the Tower Armouries occurs: "Engines of 6 and 12 barrels taken from the Duke of Monmouth."[1] Indeed, with certain mechanical additions they persisted till the middle of the nineteenth century alongside of arms in which the revolving principle predominates The earliest of these is the revolver gun in the Tower,[2] actuated by a match-lock which may be dated in the middle of the sixteenth century Then follow several inventions claimed by their makers to produce rapid fire, but as far as is known no actual examples have been preserved

1575 "An engine to discharge 24 bullets at one time"—of which 200 are stated to have been stored in the Tower of London together with 3000 bullets.[2] This was most probably the "orgue" referred to above.

1580. John the Almain writes to Walsingham that one of his countrymen has invented an arquebus that shall contain ten balls of lead, all of which shall go off one after another without recharging.[3]

1612 Seven-barrel gun marked "H.F "[4]

1663. Palmer produced a pistol "shooting as fast as it could be wherein the motion of

[1] *Inventory and Survey of the Armouries of the Tower of London*, vol. II, p 471
[2] *Op cit*, vol II, p 368
[3] S P Dom, cvi, 74–76.
[4] *Tower Inventory*, II, p 838.

the fire and the bullet would charge the piece with powder and bullet, prime the pan, and open the cock" This almost incredible precursor of the Maxim is quoted by Colonel Hutchison in his book *The Machine Gun* as being given in the Transactions of the Royal Society, but up to the present it has been found impossible to trace the entry.

1665. The Marquis of Worcester claimed to have produced "a cannon of four pieces which can discharge 200 bullets in one hour and a cannon that will discharge bullets 20 times in 6 minutes leaving the barrel so cool that a pound of butter will not melt on the breech."[1]

Circa 1690. Revolver carbine with wheel-lock All the chambers are revolved by hand. The barrel is marked "H K"[2]

Circa 1690. The Tower collection includes two magazine flint-lock guns in which both powder and ball are contained in the stock and are forced into the breech by a lever on the under side.

1718. Puckle's revolver gun. As this is the only machine-gun that can be credited to an English inventor it will be described in full at page 82.

1739. Four-barrel revolver gun with flint-locks. The barrels are revolved by hand, and each has a separate lock and pan. The side plate is engraved "DURLACHS 1739."[3]

1742. Welten's gun in the Zurich Museum which, from a drawing in Demmin's *Waffenkunde*, seems to have been worked with a sliding tray bearing the separate charges, much in the manner of the Hotchkiss system.

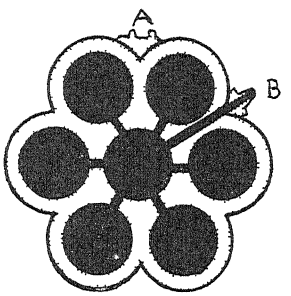


FIG. 89 SECTION OF NOCK'S SEVEN-BARREL GUN, 1807
A, sight, *B*, vent to centre barrel

Circa 1790. Revolver gun with four chambers and flint-lock. The chambers are revolved by pressing the front of the trigger-guard.[4]

Circa 1807. Nock's seven-barrel flint-lock (Fig. 89)[5] According to tradition this was produced for the Navy for clearing the fighting tops of enemy ships after Nelson was killed at Trafalgar by a shot from the *Redoubtable*.

Circa 1810. Breech-loading machine of 31 barrels, 75 inch. There are two sets of brass chambers, one plain and the other rifled, all discharged by one cap. There is a machine for charging the cylinders[6] From papers in the Royal Artillery Institution it seems that this machine was possibly brought with a large number of interesting arms from Paris in 1815.

1841. Iron rapid-fire 1·25 inch gun, invented by General Josiah Gorgas, U.S.M.A. This has a single smooth-bore barrel with 18 lined chambers with nipples for percussion caps.[7]

1864. Vandenberg Volley gun, 50. This consists of 85 barrels grouped in a bronze case. The breech piece with 85 muzzle-loading chambers pivoted on the barrel-casing is screwed home for action. All barrels are fired simultaneously by one percussion

[1] *A Century of Inventions* (1655), Nos 30, 34
[2] *Tower Inventory*, II, p 389.
[3] *Tower Inventory*, II, p 390.
[4] *Tower Inventory*, II, p 390
[5] *Tower Inventory*, II, p 391.
[6] *Catalogue of the Rotunda Museum*, Woolwich (1906), p 115.
[7] *Catalogue of Ordnance Museum*, West Point, U.S.A (1929), p 172.

cap.[1] This gun is of some interest, as with the exception of Puckle's gun it is the only machine-gun produced in England It was made in London by Robinson and Cottam from designs by General Vandenberg, who from the correspondence respecting its trial must have been an American citizen A letter quoted in Army Ordnance (U.S A.), vol. xxv, 141, p 393, from the Chief of Ordnance, dated May 5, 1864, states that Mr Vandenburgh [*sic*] presented three of these guns to the President of the United States "as an offering to our Government and country," the transport charges from Liverpool being £43 5s. 11*d* After an exhaustive test it was found that one of the carriages broke down "from inherent weakness," after nine shots from one of the guns the elevating screw broke, and finally the barrels were so fouled with lead and powder that it took a man nine hours to clean them. As the Ordnance authorities could give no time for repairs, and as the Government was fully occupied in the Civil War of 1861–65, the guns were returned to Mr Vandenberg in London.

In addition to these the West Point Museum exhibits the following, all of the period 1860–65.

The Williams rapid-fire gun, 1·56, stated to have fired 63 shots per minute by a lever which opens the breech and on closing releases the hammer, the 'Coffee Mill' gun, invented by E. Nugent, with one barrel, 58, and a number of muzzle-loading chambers; the Guthrie and Lee Explosive Firearm, consisting of two barrels, 69, and a breech-block of four chambers loaded with paper cartridges from a trough The lever, as it loads the cartridges, places a paper cap on the nipple and releases the hammer.

In 1871 Mr Taylor, of Pennsylvania, produced a multi-barrel gun, described as "of astonishing complexity." It had 61 barrels in a cylindrical water-tight drum and a drum containing 61 cartridges. The barrels were set slightly deviating from the parallel so as to give a wide field of fire. Ten volleys of 61 rounds each could be discharged before reloading was necessary.

In 1876 and 1878 Fortune Bailey devised belt- or chain-fed guns, and a gravity-fed gun, but neither of these was taken very seriously as the Gatling gun had by this time achieved popularity.

As Puckle's gun was and is the only rapid-fire gun invented and made by an Englishman, and as most students of firearms have some knowledge of this weapon through the illustrations to his patent specification, which have been frequently reproduced, it may be of interest to describe the inventor and his gun in some detail

Puckle's Gun

James Puckle (1667?–1724), who holds a unique position as the only English inventor of a machine-gun (Fig. 90) throughout the whole history of British artillery, was a Notary Public, or, as we have it to-day, solicitor, and an author of books and pamphlets which seem to have achieved some popularity His best-known work, *The Club*, is a dialogue between father and son on the evils of drinking to excess, coupled with serious advice and warning to young men. It was first published in 1710 and went into ten editions, the last being in 1900.

Puckle must have been also a competent mechanician or he must have employed skilled

[1] *Catalogue of Ordnance Museum*, West Point, U S A , p 172.

gunmakers to carry out his ideas for in 1718 he took out a patent (No. 418) for "a Portable gun or machine called a Defence which can be so quickly loaden as renders it next to impossible to carry any ship by boarding . . . it is suitable for Bridges, Breaches, Lines, Passes, Ships, Boats, Houses and Other Places."

The finished brass gun at the Tower is mounted on a tripod, and there are separate cylinders which can be fitted on to the spindle at the breech, each cylinder being engraved at the base:

Defending King George your Country and Lawes
Is defending yourselves and the Protestant Cause

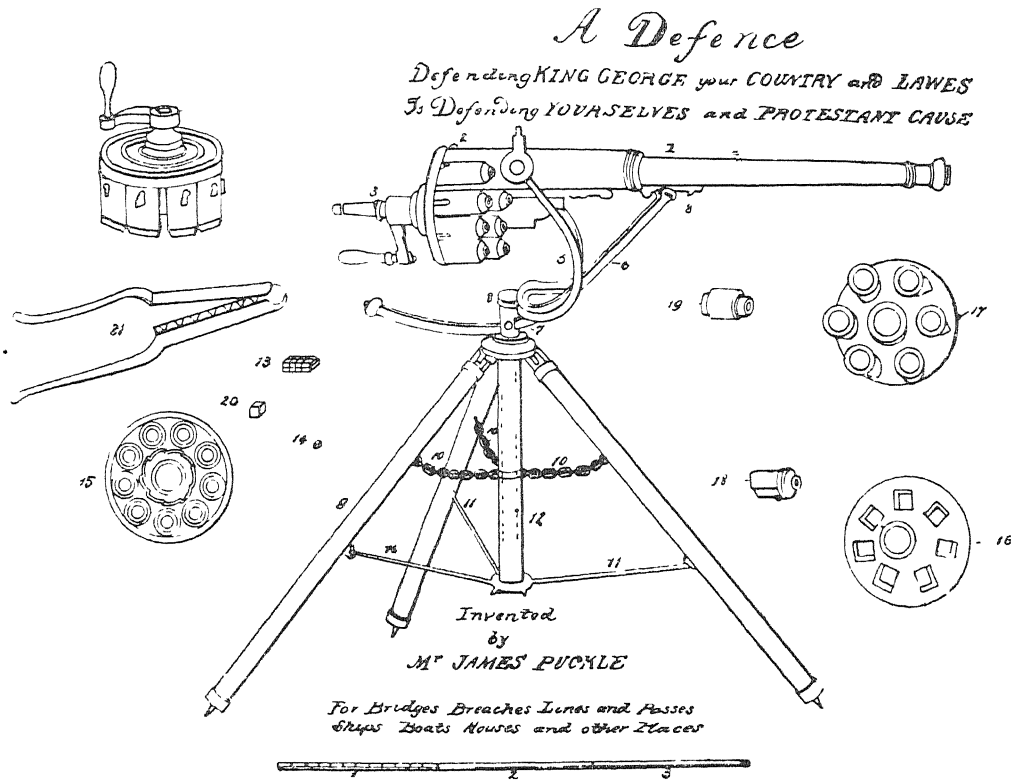


FIG 90 PUCKLE'S GUN, 1718
From the specification in the Patent Office

Beneath this are representations of the King, Britannia, and an open book marked "HOLY BIBLE." At the rear of the cylinder is a cranked handle which engages on the screw thread of the spindle.

The rear end of the barrel is slightly enlarged and each of the chambers is tapered at the fore-end. When the cylinder has been turned to bring a chamber opposite to the breech a half-turn of the handle forces it snugly home. On the top of each chamber is a pan with a deep vent, the barrel being fitted with a flint lock. One of the serious drawbacks of this and of all breech-loading flint-lock guns was the faulty obturation, for no method had been discovered for making the breech gas-proof, and there was always the danger of a flash back. In Puckle's gun this was particularly faulty, as the other chambers were close to

the chamber fired Puckle was evidently a very militant Christian for some of the chambers are made to contain round shot for Christians while others have square bullets against Turks" The gun also fired grenadoes' which seem to have been a species of shrapnel

On March 31, 1722 the gun was tested in the Artillery Ground in City Road The *London Journal* gives the following description of the experiment

> On Wednesday sennight last in the Artillery Ground was a performance of Mr Puckle's machine and it is reported for certain that one man discharged 63 times in 7 minutes though all the while it was raining and that it throws one large or 16 musquet balls at every discharge with great force

Now, unless the one man' had a number of assistants, or had at least seven cylinders ready loaded, he could not possibly have achieved this rate of rapid fire for the necessary operations were (1) Each cylinder—some have seven and others more chambers must be loaded with powder, wad and round or square bullet unless Puckle had devised some form of cartridge (2) The empty cylinder must be unshipped and the loaded cylinder fitted on to the spindle (3) The touch-hole of each chamber as it came into position must be primed (4) The trigger must be pressed with the chance of a misfire of the flint And all these operations had to be conducted while it was raining

This exhibition was doubtless made to impress the public, for Puckle, being a shrewd business man, attempted to form a company to exploit his gun, but nothing more is heard of it Evidently the Army authorities were not impressed, and it was not until 1862 that the system of rapid fire was considered seriously and the Gatling gun came into being

The illustration given on the specification in the Patent Office is described as follows

(1) The barrel
(2) The chambers ready for firing
(3) The screw upon which every set of chambers play off and on
(4) A set of chambers ready charged
(5) The crane to rise, fall, and turn the gun round
(6) The curb to level and fix the gun
(7) The screw to rise and fall it
(8) The screw to take out when the gun is to be folded up
(9) The Tripeid, or Tripod
(10) The chain to prevent the Tripod extending too far
(11) Hooks to fix the Tripod
(12) The tube wherein the pivot turns
(13) A charge of 20 square bullets
(14) A single bullet
(15) Chambers for a boat
(16) Chambers for shooting square bullets against Turks
(17) For round bullets against Christians
(18) Single square chambers
(19) Single round chambers
(20) Single bullet for boat
(21) Mould for casting single bullets

This gun of Puckle's, which must have been well-nigh forgotten for over a hundred years, came to light in 1849, when Sam Colt, the inventor of the percussion revolver that is known by his name, brought an action against the Massachusetts Arms Company for

infringement of his patents In an attempt to prove that Colt was not the inventor of the revolver principle the defendants produced a model of Puckle's gun made from the drawing in the British Patent Office, but as the patent specification gives no details of the mechanism this model must have been a crude contrivance Colt held that, whereas Puckle's gun

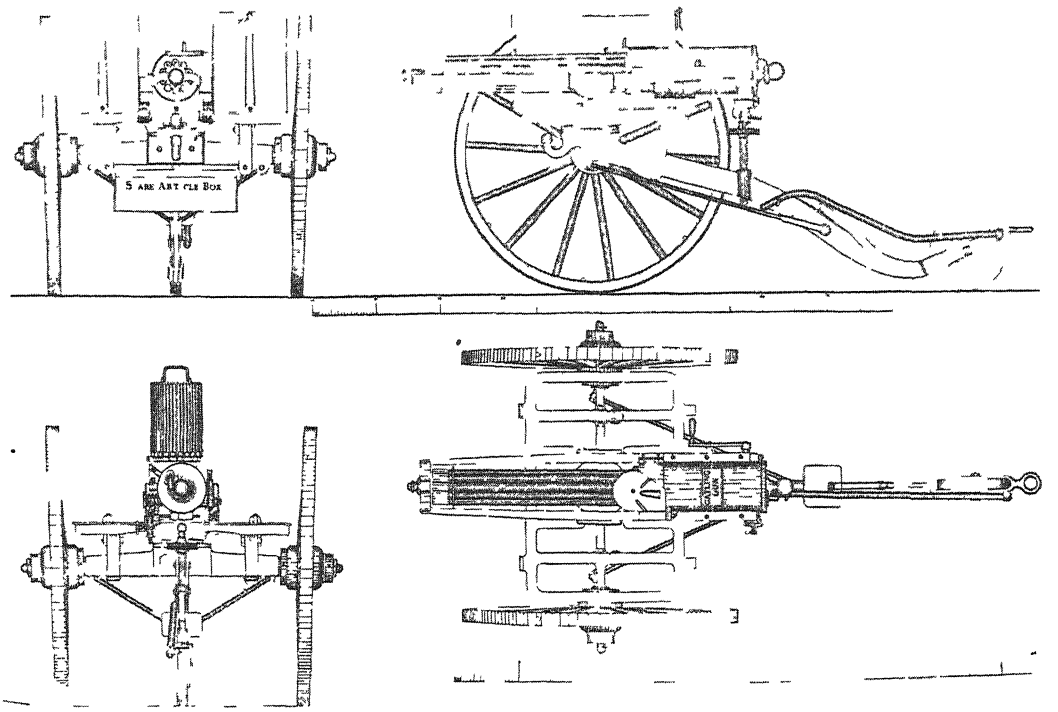


FIG 91 GATLING GUN, 1862
Crown copyright War Office

needed two strong men to carry and use it, his revolver could be lifted and fired with one hand [1]

The court allowed Colt's claim, and the Massachusetts Arms Company closed down

And thus the first and only British machine-gun passed into oblivion till 1936, when it was discovered by the present author in the collection at Boughton House, Kettering On learning of its value to students the Duke of Buccleuch very generously deposited the iron experimental gun and the finished brass gun in the Armouries of H M Tower of London in 1936

The Gatling Gun

The first machine-gun of a really practical design was invented by Dr Gatling, of Chicago, in 1862 and consisted of six or ten barrels revolving on an axis parallel to the bore (Fig 91) Each barrel has a separate lock and striker The cartridges are fed from a trough

[1] J Rohan *Yankee Arms Maker* (1935) p 176

above the gun and fall by weight, each entering a barrel in turn at its highest position The crank handle being revolved, the cartridge is fired when it reaches the bottom. As the barrels turn the spent cartridge is extracted. Thus the revolution of the barrels feeds and extracts the cartridges till the trough is empty. The whole is cooled by a water-jacket and, under good conditions, 280–300 shots a minute was considered to be a good performance. One of the drawbacks to this gun was that the cartridges were not the solid drawn cases, as used to-day, and because of faults in their manufacture cartridges jammed in the barrel, and failed to extract. The Gatling gun was first used in the American Civil War, and was later exported to China, Turkey, Egypt, Japan, and Russia. So popular was it with the Russian military staff that it was manufactured in Russia and became known as the Goroloff gun, after the officer who superintended its manufacture. After tests of the French 'Mitrailleuse' and the Gatling gun in 1870 the latter was adopted for the Navy in 1871, the Army following suit shortly after. Gatlings were used in the Zulu War of 1879 with good effect, and experiments were made for mounting these guns in anti-torpedo vessels and on light carriages for landing parties.

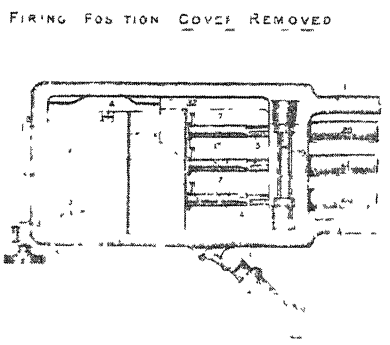


FIG 92 NORDENFELDT GUN, 1881
Crown copyright, War Office

Much has been written of the French Mitrailleuse, which was made by Mortigny, an engineer of Fontaine l'Eveque, near Brussels, the original design being by Captain Fafschamps, a Belgian officer

The principle of revolving barrels was the same as that of the Gatling gun, but the loading and dropping into place of the cartridges was more complicated As this gun was never seriously considered as a weapon for the British Army there is no need to go into its mechanical details, which may be found in any of the works given in the bibliography at the end of this volume. Suffice it to say that after the tests made in 1870 the Gatling made 2803 hits against the Belgian gun's 1708, and the Gatling battery took up only 156 yards area while the Mitrailleuse battery needed 353 yards.[1]

The Nordenfeldt Gun

The next variety is based on the 'orgue' of several barrels conjoined, but in this case they are not stationary but move laterally The first of these was invented by H Palmcrantz, an engineer, about the year 1873, and financed by Thorston Nordenfeldt, a Swedish banker who had offices in St Swithin's Lane, London As the combination of the two names was cumbersome the gun became known universally as the Nordenfeldt gun (Figs 92–95)

There were several varieties, ranging from three to six barrels, which were moved backward and forward by a lever at the rear. There is a piston with spiral spring for each barrel, and the cartridges on the top of the gun fall by weight as the gun is manipulated. For the

[1] Lieutenant-Colonel G S Hutchison, *Machine-guns* (1938).

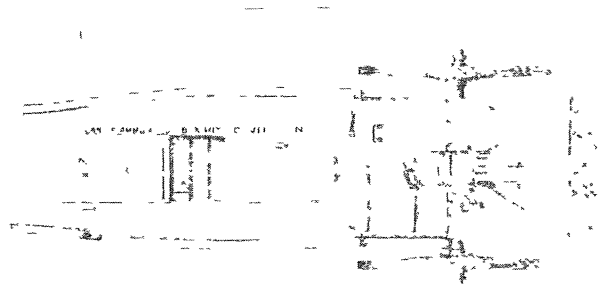


FIG 93 NORDENFELDT CARRIAGE
Crown copyright, War Office

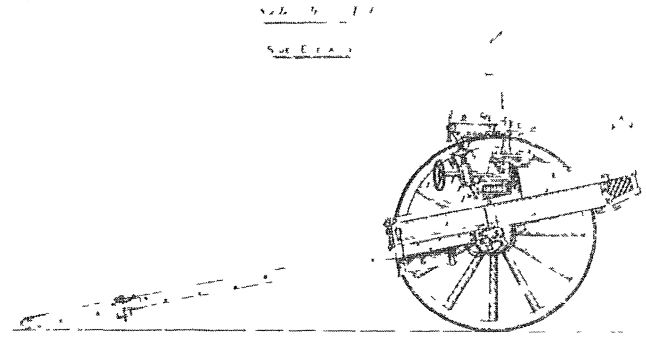


FIG 94 NORDENFELDT CARRIAGE
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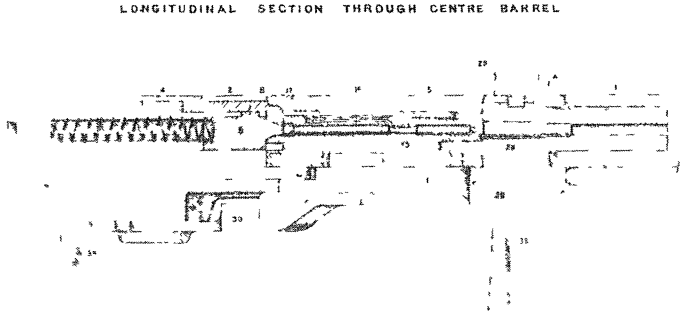

FIG 95 NORDENFELDT GUN
Crown copyright War Office

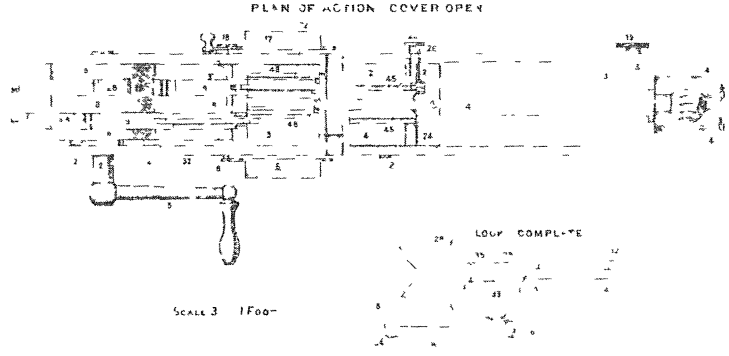

FIG. 96 GARDNER GUN, 1881
Crown copyright, War Office

three-barrel gun there are twenty-seven cartridges mounted on wooden strips. As each barrel comes under the hopper a cartridge falls and is forced into the chamber by a plunger, and when the round is fired the barrel is moved and the spent cartridge falls to the ground. One of the chief advantages was that the cartridges were solid brass drawn and there was no jamming with faulty cartridges as was the case with the Gatling gun. Although but one barrel could be fired at a time the mechanism, in the hands of a well-trained gun-layer, was so contrived that 350 shots per minute was considered to be good shooting. The calibre was one inch. After a long series of trials the Nordenfeldt (·45 inch) was adopted by the Navy about the year 1881, and was specially mounted in torpedo boats, but a number of Gatling guns were still kept in service. These machine-guns were found to be very efficacious during the Siege of Alexandria in 1882, and on land mountings the Naval brigades used them during the operations on the Nile in 1884. In the following year they were adopted by the Army.

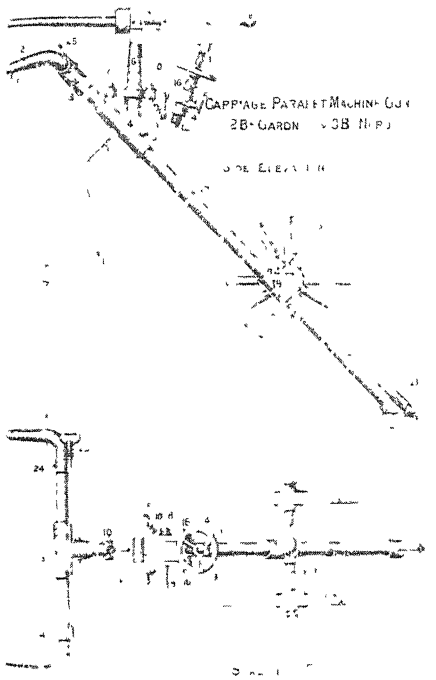

FIG. 97. GARDNER PARAPET CARRIAGE
Crown copyright. War Office

The Gardner Gun

This gun was invented by Captain Gardner, of the United States Army (1841–77). His earliest pattern, based on the same principle as the Nordenfeldt gun, was produced about the year 1876, and was introduced into the British Service in 1881. At this time the Admiralty was making trials of Gatling and Nordenfeldt ·45 calibre guns more especially for use in the new torpedo boats. There were several varieties of the Gardner, of two-, five-, six-, and later of single-barrel type. As in the Nordenfeldt there was a vertical field for 31 cartridges, the cartridge holders being mounted on wood blocks. In the *Handbook* of 1900 the calibre is given as .303 and the gun is sighted up to 2500 yards. The peculiarity of the Gardner lay in its carriage, which could be raised to enable the gun to fire over a parapet, a design which was also employed in the early type of Maxim (Fig. 97).

The Hotchkiss Gun

Benjamin Berkeley Hotchkiss (1826–85), of Watertown, Connecticut, U.S.A., a gun-maker, was particularly impressed with the need of rapid fire in the Army, and devoted himself to devising improvements during the Civil War and its widespread operations. About the year 1875 he established himself at Saint-Denis, in Paris. His first invention was a multi-barrel gun, in many respects similar to the design of the Gatling gun. Like the Gatling, the Hotchkiss was fed from a hopper, but the principal difference was in the calibre, which was 1·45 inches and fired explosive shells, while that of the Gatling gun was

·50 inch With the advent of the Nordenfeldt gun and the appearance of the early torpedo boats in 1876 trials were carried out at Portsmouth with Hotchkiss and Nordenfeldt guns, with the result that the latter was adopted for the Navy though it was admitted that the Hotchkiss gun made good shooting. Its inventor, however, was not discouraged, but started afresh on entirely new lines. His new gun had a single barrel, fed from left to right by a metal belt, but the breech action, loading, and ejection was produced by the explosive gas which before the bullet leaves the muzzle escapes through a hole underneath the barrel

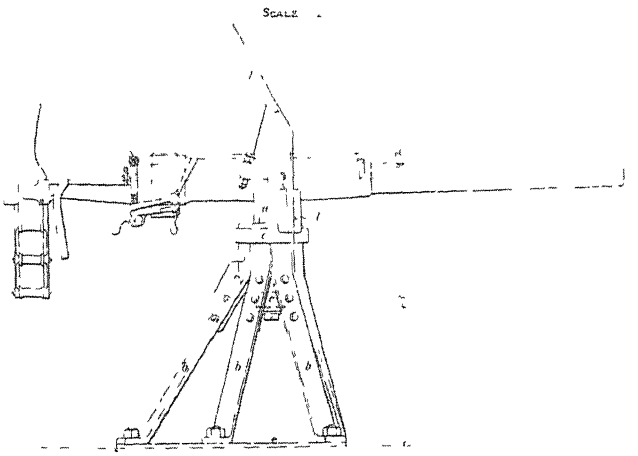

FIG 98 HOTCHKISS GUN, NAVAL MOUNTING
Crown copyright, War Office

As the gun was reported to fire 600–650 shots a minute the barrel overheated considerably, and the cooling was effected by wings or flanges at the breech end, or in emergency, by changing the barrel—an operation which could be carried out very quickly.

This weapon was adopted by the French Army and was used with great effect in its campaigns against the Moors; and by the Spanish, Dutch, and Japanese Armies. It was not adopted by the British Army as their standard weapon, but was issued to auxiliary units. In the war of 1914–18 it was used by Indian regiments.

The Maxim Gun

Hiram Maxim (1840–1916), of Sangeville, Maine, U.S.A ,[1] was in turn a coach-builder, machine engineer, and shipbuilder. His inventive trend covered electric lighting, gas-engines, vacuum pumps, etc. In 1881, after a visit to the Electrical Exhibition in Paris, he started a workshop in Hatton Garden, where from the original idea of a repeating rifle he evolved a machine-gun mounted on a tripod. He was a rich man and could, therefore, be lavish in his experiments and, in addition, he had well-tried assistants who would not divulge the progress of his experiments till they were secured by a patent

The principle of the gun is that it consists of a single barrel the recoil of which ejects the spent cartridge and sets another in its place. The cartridges were, and still are, fitted to a webbing belt which is automatically fed from right to left. After several trials a gun

[1] Naturalized British subject, knighted 1901

was perfected which, according to the newspaper reports of the period, fired 600 bullets per minute. Maxim's workshops were visited by the Prince of Wales (Edward VII), Lord Wolseley, the Duke of Cambridge, and a host of War Office officials, and in 1885 86 trials were carried out with remarkable success. As it was impossible to work on a large scale at Hatton Garden the contracts were placed with Messrs Vickers at Crayford, Kent,[1] and it was introduced into the British Army in 1888 The breech mechanism is operated by hand to insert the first cartridge into the barrel, the trigger is then pulled to fire the cartridge, causing the barrel to recoil. During the recoil the breech is opened, the empty shell extracted, the firing pin cocked, and a cartridge brought into position and pushed into the

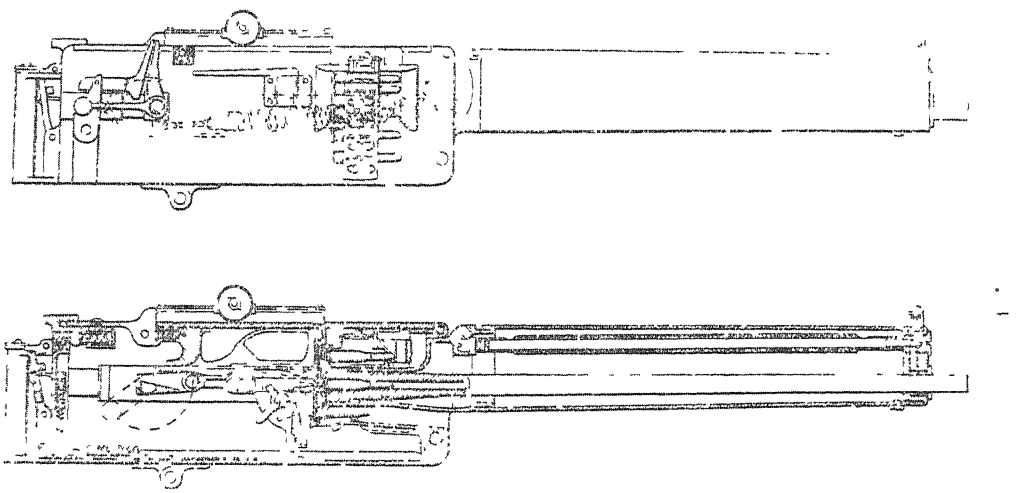

FIG 99 MAXIM GUN 1889
Treatise on Military Small Arms 1889

barrel The force of the recoil stores up energy in a spiral spring which returns the barrel to the firing position, inserts the cartridge, and closes the breech The gun is automatically fired as long as the trigger is pulled. The cartridges (250) are fitted to a webbing belt moving from right to left. The barrel is cooled by a water-jacket. The rate of fire is six hundred rounds a minute The new gun had a calibre of three-quarters of an inch, and at a later date Maxim produced what is popularly known as the 'pom-pom,' a heavier gun of 3-inch calibre which fired an explosive shell of one pound. Every Government in the world became keenly interested in what may be ranked with the first match-lock musket, the percussion lock, and the rifle as epoch-making in the history of military weapons. Patents were infringed, new improvements were produced, and at the present day every army has as part of its essential equipment some variety of Maxim's invention.

Many of the heavy type were produced for the Boers, as they were the most mobile form of artillery that they could deal with. By a curious flashback in military history the anti-aircraft defence of London in 1914 was composed of 1-pounder pom-poms captured from the Boers in 1900, and one of these, installed on the roof of Gresham College, fired the

[1] Sir Hiram Maxim, *My Life* (1915)

first round in history from the City of London against a foreign enemy at 10 30 P M on September 8, 1914, when a Zeppelin airship bombarded Holborn.[1]

The later types, such as the Madsen (1904) and the Lewis Gun (1915), Browning, etc., involve a wider and more technical study than is possible within the compass of the present work, and these will be more profitably studied in the military textbooks from 1900 onward.

As all the machine-guns used in the British Army were produced by American inventors it is of some interest to give the dates of the various types of American machine-guns.

1841 Gorgas: smooth bore with eighteen chambers.
1861. The Gatling gun. used in the British Service.
1862. Union Repeating Gun ("Coffee Mill").
1865. Guthrie and Lee two-barrel explosives fire-arm
1865. Williams: breech-block moved back and forth horizontally.
1865. Vandenberg. Volley gun made by Robinson and Cottam, London, England; eighty-five barrels, muzzle-loading, all fired simultaneously by a percussion cap. This was offered to the United States but was returned as unsatisfactory.
1871–76. Taylor several patents, including drum with sixty-one tubes and another with nine barrels
1874 Gardner used by the British Services.
1874 Browning: gas-operated.
1876–78. Bailey four-barrel, belt-feed.
1876–78. Hotchkiss: metal belt-feed, tested for the British Navy.
1883. Maxim: used by British Services.
1900. Benet: based on Hotchkiss patent.
1915. McClean.
1915. Lewis. used by the British Services.

The Gatling, Gardner, Nordenfeldt, Hotchkiss, and Maxim guns are fully described in the *Book of the Machine Gun*, by Longstaff and Atteridge, and the technical details are to be found in the *Treatise on Military Small Arms* (1888).

[1] Charles ffoulkes, *Arms and the Tower*

CHAPTER VII

ARTILLERY

THE catapult, trebouchet, mangonel, and ballista all more or less derived from the mechanical principle of the long-bow were certainly the precursors of siege artillery Machines of this nature date back to very early periods, and are so complicated in construction that space cannot usefully be allotted to descriptions of them They were used for hurling stones, incendiaries, and even decomposing corpses into a besieged town They continued in use until the invention of gunpowder and, being far more cumbersome for transport than even the heaviest cannon were gradually dispensed with [1]

When the catapult was first seen at Lacedaemon Archidamus cried 'Now mankind has come to an end' So writes Camden the historian in 1605 but this was but the beginning and the catapult was to give way to a far more destructive force Camden continues

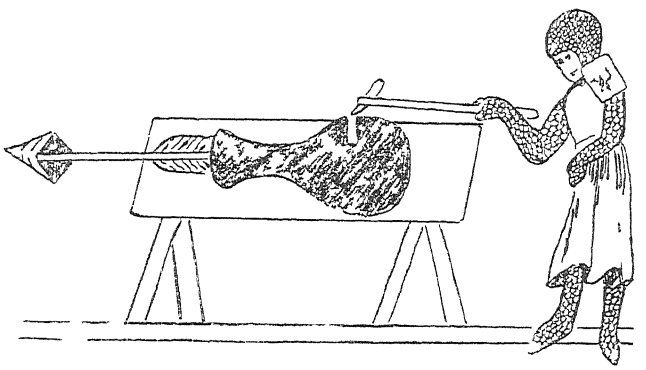

FIG 100 THE POLITE FOURTEENTH CENTURY
From a Church at Ott

> If ever the wit of man went beyond belief itself it was the invention of artillerie and engines of war Some have sayled a long course as far as China the farthest part of the world, to fetch the invention of guns but we know the Spanish proverb long wives long lies One writeth that Roger Bacon knew how to make an engine with saltpetre and brimstone which should prove notable for battery but he tendering for the safety of men would not discover it The best authorities consider that Bartholdus Schwartz a monk was responsible and that he produced the first gun

Modern writers generally agree with Camden, and whether Bacon got his inspiration from the East or whether Schwartz followed the experiments of Bacon is no matter, the accepted fact being that gunpowder as a propulsive force was compounded in Europe about the year 1320 Almost at once far-seeing military leaders saw the great value of this new force if properly harnessed, and immediately the smiths and the brass-founders were set to work experimenting It needed careful calculations to decide what thickness of barrel and breech would stand lateral pressure and recoil, and there must have been serious casualties before the proper measurements were decided upon Experiment goes on even to-day for guns with new breech blocks are tested with a reduced charge gradually increased till the desired figure is reached

John Ardenne, a surgeon in the reign of Edward III, gives the earliest English account of the composition of gunpowder [3]

[1] Their construction is fully described with illustrated diagrams in the *History of Projectile throwing Engines* by Sir R Payne Gallwey (1907)

William Camden *Remains concerning Britain* (Artillerie) p 267 *et seq*

[3] *Practica*, British Museum Sloane MS 335 pp 2 22 795

12 pounds of live sulphur, 2 pounds of willow charcoal, 6 pounds saltpetre, if they be well ground on a slab of marble, then sift the powder through a fine kerchief this powder is useful for throwing balls of iron or lead or brass from an instrument they call a Gonne

The names of the different types of artillery used to-day are still derived from weapons of a very early period The mortar is but the chemist-experimentalist's mortar used with a pestle, the gun is derived from the great mangonel (catapult) of the Romans, and the cannon is the canna, or reed, through which Greek fire was projected This Greek fire is described at p 140

The earliest English illustration of a cannon is to be found in the library of Christ Church, Oxford In this the artist shows that he can never have seen such a cannon, it has such a large breech and narrow muzzle that if it was fired there would be a disastrous explosion (Fig 100) Ardenne's recipe for gunpowder continued to be the basis of calculation, though the proportions of the ingredients were changed in succeeding centuries Early cannon-balls were either of roughly fashioned stone or of wrought iron, the former, in England, coming mostly from the quarries near Maidstone

We have referred to the two metals—iron and brass—used for making artillery, these needed two distinct types of craftsmen The bronze-founder had an advantage in that if his gun were to burst or prove itself faulty he could recast it, while the smith would have to start *de novo* and make a new gun of new materials Probably the earliest guns were the 'built-up' guns of iron, for these could be made by smiths or armourers all over the country The procedure adopted, as far as we can judge by examining existing specimens, was as follows on a mandrel of wood a number of iron bars were temporarily fixed, longitudinally and very closely together, and over these, rings, heated to a white heat, were shrunk on Possibly some crude form of welding was adopted afterwards For technical reasons the barrel only could be made in this way, and the chamber, or breech, was forged out of the solid ingot, with a tapered end to fit snugly into the rear end of the gun And thus, though it took many years to perfect the breech-loading musket, the first cannon, from force of circumstances, was a breech loader The gun was firmly lashed to a heavy bed of timber with a stout block at right angles to the rear end When the gun was loaded and the chamber put in place wedges were driven between the rear block and the chamber to drive it home (Fig 101) The earliest dated English guns of this type were two cannon left by the English when they evacuated Mont Saint-Michel in 1424 They are 12 feet in length, of 18 inches calibre, and weigh about 5 tons Another piece of the same type but with also a long documented history is "Mons Meg," still guarding the fortifications of Edinburgh Castle (Fig 102) There are several traditions as to its origin and date, but as we know that it was used at the siege of Northiam in 1479 it must have been made years previously. After many years of service the gun was burst in 1682 when firing a salute, the Duke of York (James II) narrowly escaping an accident [1] This gun, as far as can be learned, had a screw breech, as there are sockets in barrel and chamber for inserting handspikes for screwing

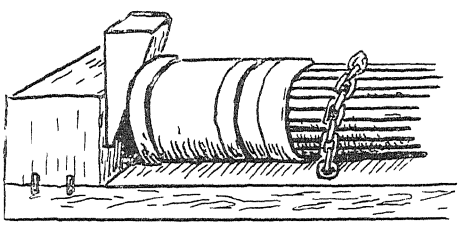

FIG 101 BREECH BLOCK FOURTEENTH AND FIFTEENTH CENTURIES

[1] *Inventory and Survey of the Armouries of the Tower of London* vol II, p 474

it up. For over a hundred years it has been in such a rusty condition that no one has had the courage to test this theory. Its length is 13 feet 2 inches, its calibre 19½ inches, and its weight 5 tons

As built-up guns could be made economically by local smiths they continued in use for warships till the middle of the sixteenth century Several of the guns of the ill-fated *Mary Rose*, sunk off Portsmouth in 1545, were salved by Anthony Dean in his newly invented diving bell in 1836 (Fig. 103), and can be seen at the Tower During this period, however,

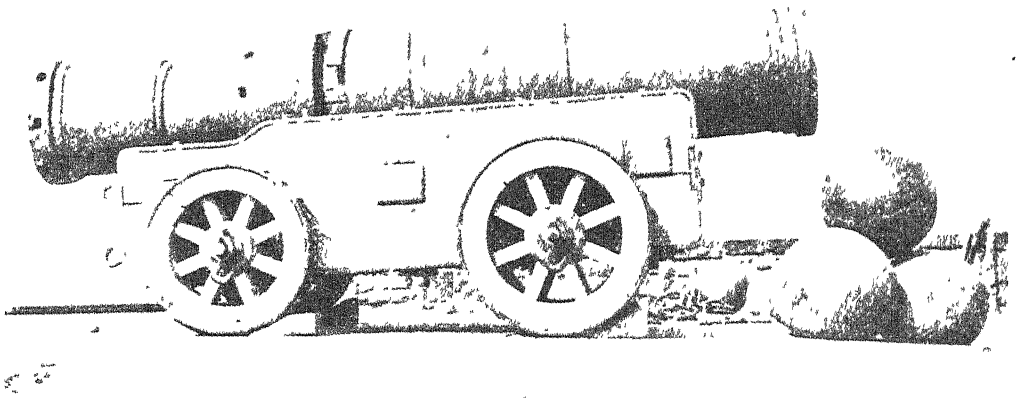

FIG 102 MONS MEG (1840), EDINBURGH CASTLE
From a photograph by Jan Smith Edinburgh

the gun-founders had been active, and besides casting brass guns, which, being also bell-founders, they could do without difficulty, they cast iron guns. In making these weapons they followed in external form the built-up gun by adding rings to the barrel, although these were not of much constructional value (Fig 104). In recording the making of cast iron or brass cannon we are fortunate in having several illustrated works which give the details of construction—which in the case of hand firearms are so sadly lacking.

The gun of brass or iron was cast in a sand mould with the breech end at the bottom of the mould. All writers urge the importance of drying the sand.[1] For forming the interior of the barrel two processes were employed: either a core of wood covered with baked clay was placed inside the mould at the required distance from the walls of the barrel, or the

[1] Louis de Gaya, *Traite des Armes* (1678, new edition 1911), p 86

gun was cast solid and drilled (Fig 105). For both of these operations the minutest calculation was needed, for should the core or the drill be the slightest fraction out of alignment one side of the barrel would be thicker than the other, and the explosion of the powder would naturally expend its force on the weaker side.

Monge, who wrote in 1795,[1] gives directions together with illustrations for boring, but Diderot, in his monumental *Encyclopédie*,[2] illustrates both the core and the vertical boring

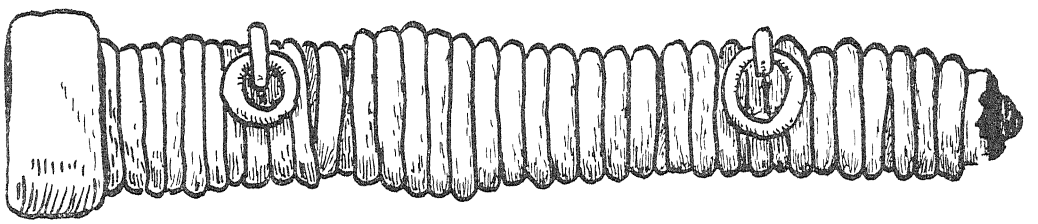

FIG 103 'BUILT-UP' GUN FROM THE "MARY ROSE," 1545

machine. The latter must have been extremely difficult to adjust, and in England the horizontal borer was preferred. This was worked by water-power, while the iron-founders mostly worked in Sussex, where the forests of the Weald were in close proximity to iron mines.[3] Brass was at first used mostly for large calibre guns, which were often highly decorated, while those of iron, being coarser in texture, never had more than a simple monogram on the barrel. Trunions are first mentioned in 1465, in the accounts of the city of Lille, when one damaged trunion had to be repaired. The 'dolphins,' or loops for lifting the barrel, are often highly ornamented by forms of mermaids, fish, etc. They appear on most of the early bronze guns, especially those of great weight, but are seldom found on iron guns (Fig. 106). Brass field artillery muzzle-loading guns continued in use up to about 1860 and these, for sixty years, were cast at Woolwich (Fig. 112). Before this, in 1704, the largest gun-foundry in London was established by Matthew Bagley, a bell-founder in Windmill Street, London, on the site later occupied by Whitefield's Tabernacle. At the end of Marlborough's campaign numbers of captured French guns were sent to Bagley to be melted down and to be recast as British guns. In May 1716 a distinguished company was invited to see the casting, but, owing to some fault in the mould, probably damp, the molten brass exploded and killed Bagley, his wife, son, and nine workmen, and seriously injured the Chief Ordnance Officer from Woolwich, General Borgard.

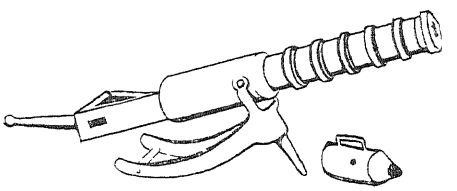

FIG 104 IRON BREECH-LOADING GUN FIFTEENTH CENTURY

With most commendable rapidity the Ordnance Board moved; and in June of the same year laid the foundations of Woolwich Arsenal. When this was completed it was realized that with the death of Bagley there was no Englishman competent to direct the Arsenal and gun-foundry. Eventually, in 1716, a young gun-founder named Schalch, of but twenty-three years of age, was invited over from the French foundry at Douai and given the rank

[1] *L'Art de Fabriquer les Canon*
[2] Vol. v.
[3] E. Straker, *Wealden Iron* (1931).

of Chief Organizer, at a salary of £1500 per annum. At Woolwich all the Government brass guns were cast, those of iron still coming from Sussex

On Schalch's retirement in 1770 another foreigner, Jan Verbruggen, a Dutchman, was brought over from The Hague, and on his death in 1786 two English brothers, John and Henry King, succeeded him.

The gun-foundries of Sussex date from 1543 when, according to Holinshed,[1] the first iron guns were cast by Ralphe Hogge and Peter Baude at Buxted, in Sussex Baude, who

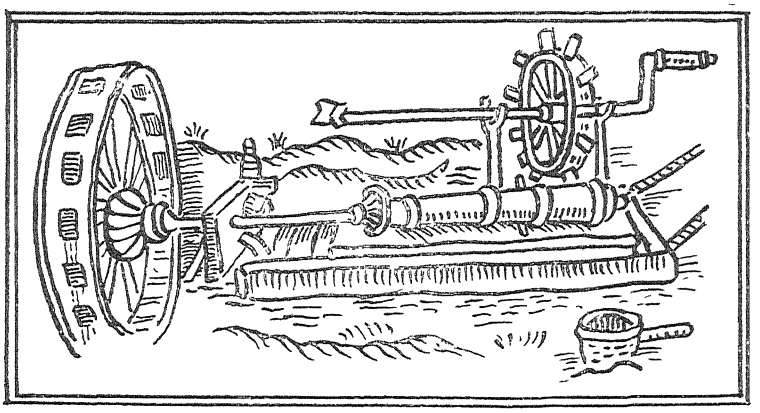

FIG. 105 DRILLING THE BORE, SEVENTEENTH CENTURY
Norton, *The Gunner* (1628)

was one of the foreign craftsmen employed by Henry VIII, was a skilled bell- and gun-founder whom Henry sent to Sussex to instruct Hogge and his co-workers Baude produced for Henry a fine two-barrel gun, now in the Tower of London, and a bell at Sutton Place, Woking.

The iron-foundries of Sussex spread, and supplied many guns for the ships of Queen Elizabeth. At a later period, 1650-1787, the Fuller family was the chief of the founders who received large contracts from the British and other Governments. John Fuller, the

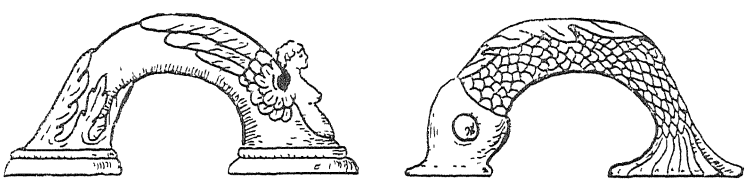

FIG. 106 DOLPHINS, LATE SIXTEENTH CENTURY

principal member of the family, controlled the largest foundry in England and undertook, when time permitted, contracts for Ireland and Sardinia and Naples. He marked the trunions of his guns with "J F.," which can be seen on examples at the Tower of London and on the ramparts at Monaco (Fig. 108). Towards the end of the eighteenth century the same foundries discovered that as they had denuded the local forests of timber they could not continue smelting iron The result of this was that the industry moved to Carron, near Falkirk, where coal and iron were in close juxtaposition. Here were produced the

[1] *Chronicles of England, Scotland, and Ireland* (1577), vol III, Part II, p 960

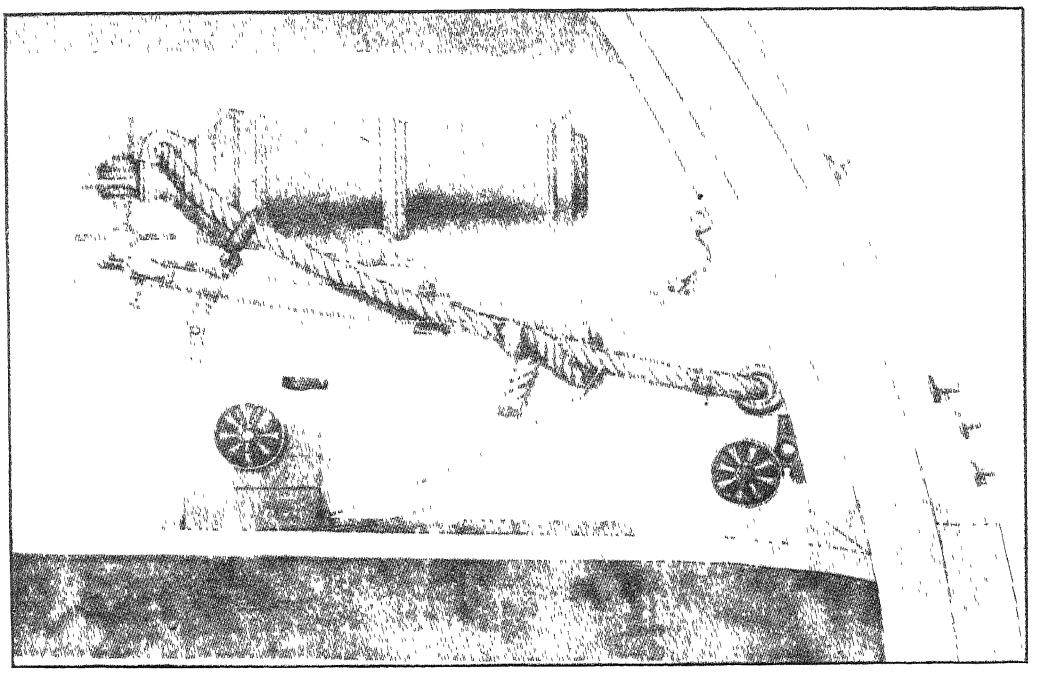

FIG. 107 CARRONADE, 1812
From a drawing

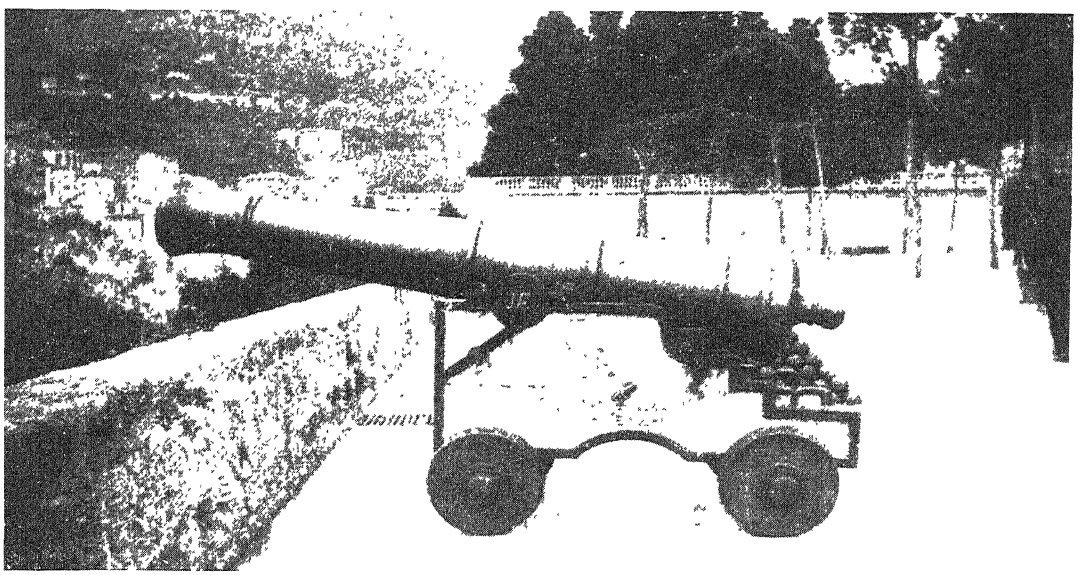

FIG. 108. JOHN FULLER'S GUN (1769), MONACO

G

short-barrel carronades for the Navy in 1812, and twenty-nine pounders for Wellington, who wrote that he would have nothing but Carron guns as he considered that they were the best[1] (Fig. 108).

Up till now, except for what may be called the unintentional breech-loaders, the built-up guns, all guns were muzzle-loaders; but occasionally we find the true breech-loader in brass. The most remarkable of these is the famous 'Dardanelles' gun at the Tower of London. In 1453 Mahomet II, when besieging Constantinople, engaged a renegade

FIG 109 "DARDANELLES" GUN (1453), TOWER OF LONDON
Copyright Royal Artillery Institution

Hungarian named Urban to construct gun-foundries at Adrianople. When these were completed Urban and his staff set about producing great siege guns of bronze (copper and tin). In eighteen days they melted thirty-seven tons of metal, and completed this monster gun and others like it.

It is a breech-loader, the breech being screwed in by handspikes fitted into sockets in both gun and breech which were turned reversely. The screw for fitting the breech is a masterpiece of exact calculation The particulars are length complete 17 feet, calibre 25 inches, weight 17 tons 7 hundredweight. The barrel casing is 5½ inches thick[2] This gun lay for many years overlooking the Dardanelles; its range was nearly a mile, the stone ball reaching the opposite shore It was brought to England by General Sir H. Lefroy as a present from the Sultan Abdul Aziz to Queen Victoria in 1867, and deposited at Woolwich, whence it was transferred to the Tower of London in 1929 by command of His Majesty King George V With this and other similar bronze guns the breech-loading system was abandoned, although the very earliest guns of the fifteenth century were, from the limitations set by methods of construction, breech-loaders. The probability is that, as was the case over three hundred years later, the cost was prohibitive. It is of some interest to read in works as late as the middle of the nineteenth century that the objections then raised were probably those which impressed the gun-founders of the sixteenth century, namely cost, weight, and difficulty of mass production. About the year 1860 Krupp, of Essen, produced a breech-loading gun, the principle adopted being a heavy wedge moving horizontally through the breech

[1] Charles ffoulkes, *The Gun-founders of England*
[2] *Op cit*, p 13

end of the gun. At the same period Sir William Armstrong, who had been appointed Engineer-in-Chief of Rifled Ordnance at Woolwich in 1859, was experimenting with the screw breech and, to all intents and purposes, following the screw principle of the Dardanelles gun (Fig. 109). As no decision was reached he resigned in 1863. The reasons for his resignation are clear when we read what a writer ten years afterwards has said with regard to the opinions of experts as to the merits and demerits of muzzle-loading and breech-loading artillery. He writes

> Various opinions are held as to the relative advantages of breech- and muzzle-loading ordnance, but the latter would appear to be best adapted to general service as they are stronger for equal weights of metal and simpler in construction The advantages put forward for loading cannon at the breech are. that a projectile of larger diameter than the bore and thus the fire can be accurate . that the gun can be loaded when run up, the gunners therefore being less exposed . . . that the cleaning is easier and any ignited surface left in the bore can be seen and removed Breech-loading is however attended with the following disadvantages—*viz*, that the construction is more complicated than that of the muzzle-loading piece and skilled labour is requisite to keep it serviceable; that both gun and ammunition are more costly; that if the gun is of large calibre it will be unwieldy On the other hand a muzzle-loading gun has a simpler, less costly, and stronger construction; requires no particular care to keep it in working order; the ammunition is less costly and a simple fuze without percussion arrangement can be used.[1] (Fig. 112)

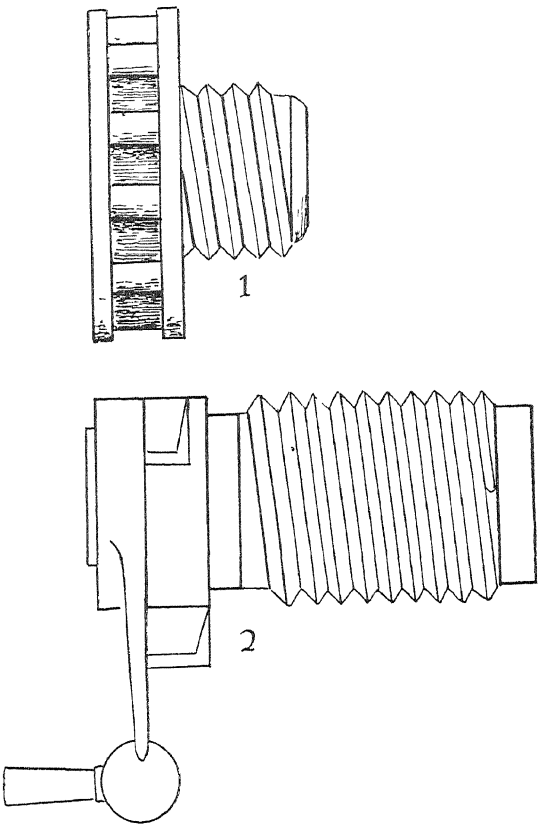

FIG 110 GUNS' BREECHES
1, breech of Dardanelles gun, 2, Armstrong's breech.

All these criticisms are also made in the textbook of Rifles Ordnance (1879), which says:

> . unless there is considerable improvement made in breech-loaders it does not seem likely that we shall adopt this system of loading instead of that which gives us such strength, security combined with accuracy, and rapidity of fire in our muzzle-loading gun.

And so the protracted discussions and experiments continued till 1886, when the *Text Book*

[1] Lieutenant-Colonel C H. Owen, *Modern Artillery* (1873), p 37.

of that year, after discussing the claims of the two systems, states, "It will now be apparent that breech-loading guns are a necessity in the present condition of artillery science"

The following list gives the dates of the various experiments which were made leading to the adoption of the breech-loading gun

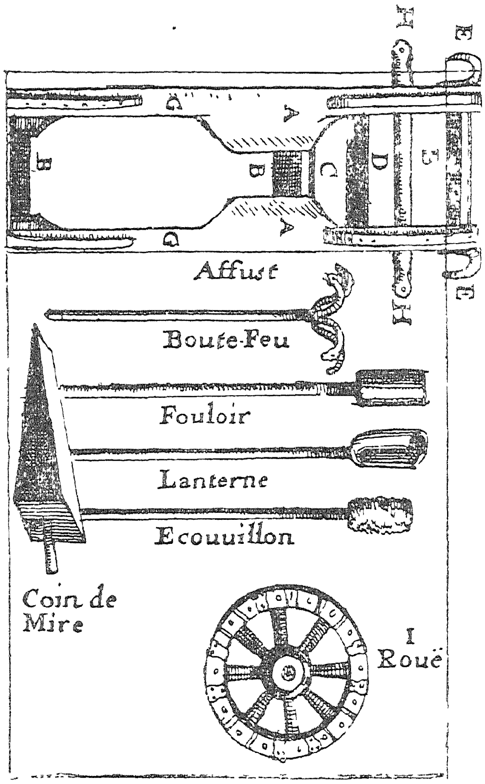

FIG. 111. GUN-CARRIAGE, 1678

AA cheeks (flasques); BB transoms (entretoises); CC transom bolts (boulons); D axle-tree (essieu); LL trace-hooks (crochets de traite); GG trail-plates (bandes de bout d'affust); HH linch-pin hole (...); I trail-wheel (roue d'affust); linstock (boute-feu); rammer (fouloir); gun-ladle (lanterne); sponge (escouillon); quoin or wedge (coin de mire)

Gaya, Traité des Armes (1678)

1856. Messrs Horsfall produced a wrought-iron gun, 22-ton, with a range of 2000 yards, muzzle-loading

1858 (August 20). Committee appointed on rifled ordnance. R. Malet produces his 36-inch mortar

1859 (February 18). William Armstrong knighted.

Armstrong produces breech-loading rifle, wrought-iron gun with range of five miles

(February 22) Sir William Armstrong appointed Engineer-in-Chief of rifled ordnance.

1860 (February 20 July 23) Committee on ordnance appointed. This reported unfavourably on the adoption of the breech-loading system

1863 (February 5). Sir William Armstrong resigns his appointment.

Armstrong's gun, 22-ton, range 4187 yards, tested and passed

1864–1870. Test of naval guns at Shoeburyness

1872 'Woolwich Infant,' 35-ton tested.

1874 Experimental gun, 80-ton, tested

1876. 81-ton muzzle-loading gun tested It required twelve men to ram home the charge.

1878 (March). Government order four 100-ton guns by Armstrong.

1879 (December). Breech-loading cannon ordered by the Government.

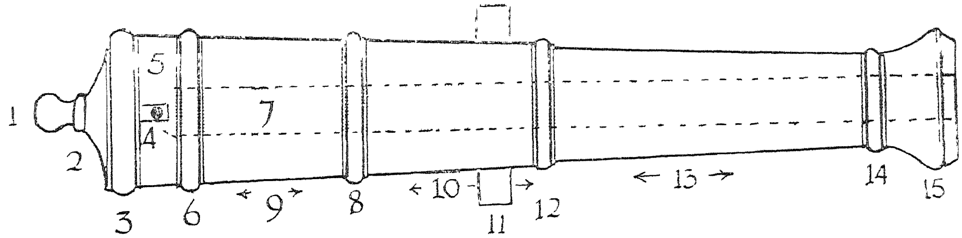

FIG. 112. MUZZLE-LOADING GUN, 1840

1, button; 2, cascabel; 3, base ring; 4, vent; 5, vent-field; 6, astragal; 7, bore or calibre; 8, first reinforce ring; 9, first reinforce; 10, second reinforce; 11, trunnions; 12, second reinforce ring; 13, chase; 14, muzzle astragal; 15, muzzle moulding

Here this complex subject must be turned over to the official textbooks and to Service writers, for, as is the case with the rifle and machine gun, the technical details are too involved to be dealt with in these pages.

Up to the last quarter of the eighteenth century guns were fired either by match or portfire at the vent, but there was always the chance, in the heat of action, of spilling some of the priming powder. Powder for loading was kept in open casks, or 'budge barrels,' and as the gunner carried smouldering match, loose powder constituted a serious danger. An attempt to rectify this was made by filling a quill with priming powder and inserting this into the vent. In 1782 the flint-lock, which could be attached to the gun barrel, was introduced by Sir Charles Douglas, in face of fierce opposition from the Admiralty, who disliked "new-fangled inventions" Douglas, however, persisted, and equipped all the guns in his ship *Duke* out of his own pocket (Fig. 113). This was followed by Forsyth, who substituted his percussion lock in 1807 (Fig. 112.)

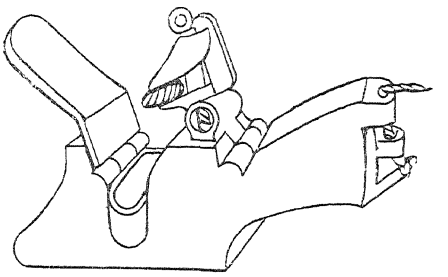

Fig. 113 Douglas's Flint Gun-lock, 1782

It is more than probable that the first experiments with the newly discovered explosive in 1320 were made with some species of mortar, as it would have been dangerous, and possibly suicidal, to produce a full-size gun before the force of gunpowder had been carefully studied. The tradition that Bacon or Schwartz or both created the first explosion in a chemist's mortar may be dismissed as a picturesque legend, but they probably used some utensil in their workshop before making a special container for their tests. The earliest mortar in England—found in the moat of Bodiam Castle, Sussex, in the early part of the nineteenth century—was purchased for the Rotunda Museum, Woolwich, in 1862 (Fig. 114). It is crude, thin cast iron, reinforced by bands of iron. It is about 48 inches long, the calibre 15·1 inches, the capacity of the chamber about 3·5 pounds, weight 6 hundredweight. It would probably throw a stone shot of 160 pounds.[1] The fact that it is of cast iron would place it during the beginning of the fifteenth century, when brass guns and mortars appeared.

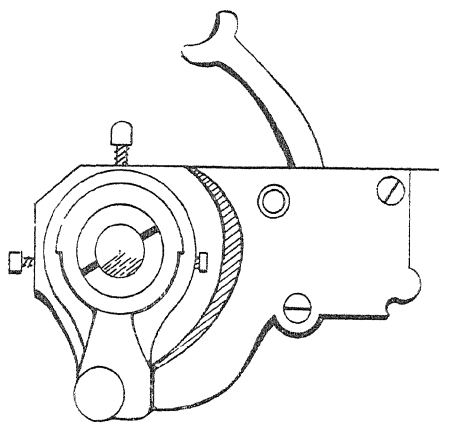

Fig. 114 Forsyth's Percussion Gun-lock 1807

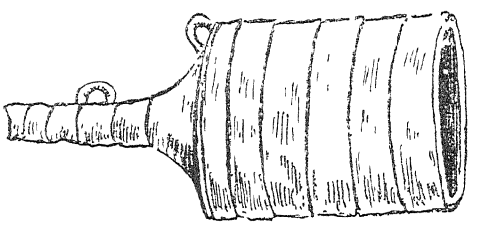

Fig. 115 Bodiam Mortar, Early Fifteenth Century
Rotunda, Woolwich

It is not till the sixteenth century that we have much information respecting the mortar,

[1] Catalogue of the Museum of Artillery in the Rotunda, Woolwich (1906), p. 1

the earliest reference being under the date 1543, when Stow records that Peter Baude and Peter van Collen cast mortars and hollow shot [1] These hollow shot were the precursors of the high explosive shell of to-day They were filled with powder and, like the grenade, had a slow match inserted which was lit just before the shell was fired (Fig 115) Senftenberg, of Dantzic, writing in 1580, describes an ingenious alternative probably appreciated by the gunner who had to take some risks with the burning fuze (Fig 116 Here the mortar was loaded with powder and the shell was provided with a fuze of some inflammable compound When the charge was fired this fuze was automatically lighted, and if the calculations respecting the fuze had been made correctly the shell would explode on reaching its destination - One of the chief supporters of the mortar as a siege weapon was Count Schulenburg (1661-1747), who entered the Venetian service and had a number of large bronze mortars which bore the name of ' Schulenburg Petriers," as they were intended for use with stone shot F Blondel [3] describes mortars made by the Poles when laying siege to Thorn, in Prussia, in 1659 These consisted of holes, dug in the ground at a proper angle, loaded up with powder and broken millstones and ignited by threads dipped in brandy In 1740 the Russians tried making mortars of ice, which discharged ice balls without bursting [4] The most practical of these emergency mortars was made in 1717 by Lieutenant Healy, R A , who cut chambers in the Rock of Gibraltar inclined so as to bear on the harbour They were loaded with powder, a wooden tampion was placed over the charge, and large stones

FIG 116 FILLING HOLLOW SHOT 1544
From a wall painting formerly at Cowdray

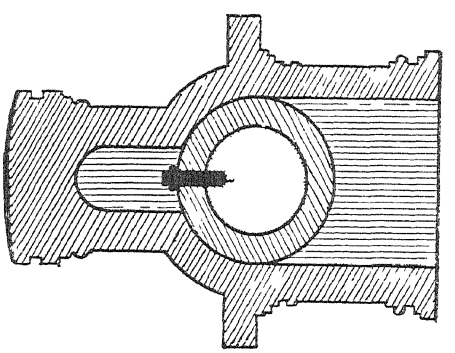

FIG 117 MORTAR LATE SIXTEENTH CENTURY

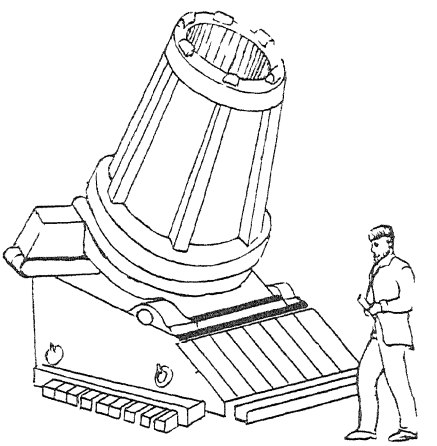

FIG 118 MALLET'S MORTAR 1857

added A copper tube filled with priming powder perforated the tampion, and, as the account naively adds, "every one retired to a safe distance when the primer was lit" [2]

The last experiment was the great mortar, designed by R Mallet in 1857, weighing

[1] John Stow, *The Annales of England* (1580), p 585
[2] W Greener *The Gun* (1888) p 29
[3] *L Art de jetter les bombes* (1685), p 524
[4] Wilkinson *Engines of War*, p 52
Francis Grose, *Military Antiquities* (1786), vol II p 161

12 tons It had a calibre of 36 inches, the charge was 80 lb of powder, the shells varied in weight from 2300 to 3000 lb and contained 400–480 lb of powder The range of 2759 yards was attained on July 28, 1858 This mortar is mounted in the shot yard at Woolwich Arsenal (Fig 116) No mortars were made after this date The later forms of breech-loading artillery embody such complicated and highly technical details that the reader is advised to consult the works given in the bibliography at the end of this volume

CHAPTER VIII

SIGNALS

THE signal is defined in modern dictionaries as a means of communication by visible or audible signs between two distant points on a preconcerted system. Basing these notes on this definition, it will be necessary to omit other means of communication, such as foot and horse runners, carrier pigeons, and that much discussed long-distance telepathy which is said to be employed in India and Tibet

It is somewhat remarkable that no detailed history, except Gamble's *Essay*[1] of 1797, has been attempted, even by the Admiralty, which was the first department to make use of the semaphore. Modern encyclopædias give little or nothing of value, confining themselves mainly to naval flag signals and railway methods.

Smoke and other Visible Signals

Under the heading of visible signals the earliest must certainly be the smoke column used in comparatively recent times by the North American Indians, who have probably carried on this system from prehistoric ages. This form of communication must have had its origin, firstly, in the discovery of fire, and, secondly, in the organization of individual men and families into tribes, for it will be obvious that individuals could not agree upon signs to give warning of attack or movements of game, but under the tribal system a code of signs could be passed on to all its members.

Writers on the subject state that by a system of covering and uncovering the smoke by sods, or by skins, or cloth, some form of code could be sent and relayed over long distances. These primitive methods died with the civilization of the Indian, only to emerge again in the Second World War, when we have records of airmen, crashed in the Libyan Desert, sending an SOS signal by smoke

From smoke we naturally turn to fire, and here we have what was one of the most remarkable pieces of signal organization in the early periods of history. Æschylus tells us in his *Agamemnon* that the watcher on the palace-roof at Argos sighted the beacon which gave the news that Troy had fallen. If Æschylus had his facts correct this chain of beacons went from Mount Ida behind Troy to the island of Lemnos, then across the Ægean Sea to Mount Athos, and then right down to Central Greece, and through to Peloponnesus from mountain to mountain—a distance of over three hundred miles to Argos

For the most part beacons were employed as an alarm-signal in this country, and it is only in recent times that they have been used for the celebration of victories or public holidays

In 1338 and 1352 instructions were issued for the maintenance of beacons,[2] and in 1386 Froissart[3] states that the beacon sites ranged from the Humber to Cornwall These were constructed of platforms set on casks fixed with sand, from which the watcher could see "seven leagues across the water" and could give orders for the beacon to be lighted.

If we leave Agamemnon's beacons in the mists of antiquity and legend, undoubtedly the

[1] John Gamble, *Essay on Modes of Communication by Signals*, illustrated (1797)
[2] Thomas Rymer, *Fœdera*, vol II, 996, vol III, 239
[3] *Chronicles*, vol II, 502

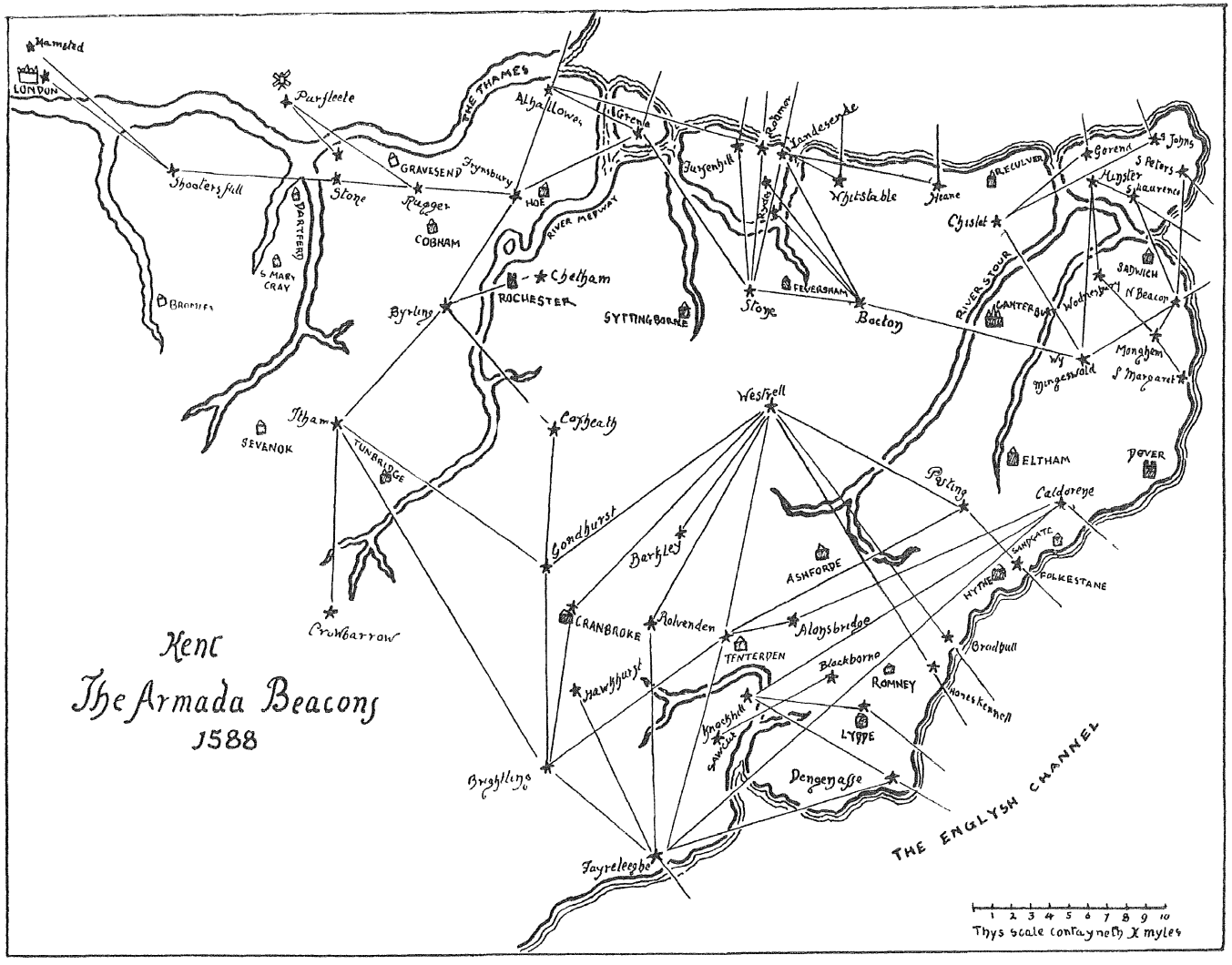

FIG 119

William Lambarde *Perambulation of Kent* (1596)

first complete system of this form of signal was ordered when news came that the Armada was threatening England A complicated network of posts, six to eight miles apart, was established all along the coast and inland, of which Lambarde[1] has given a description he also gives a map of Kent, which he states was printed on cards and distributed to all watchers, so that on seeing a light they could refer to their card and see whence the signal came (Fig 119) Beacons were not to be made of wood but tar-barrels and pitch alone could be used as it blazed instantaneously (Fig 120

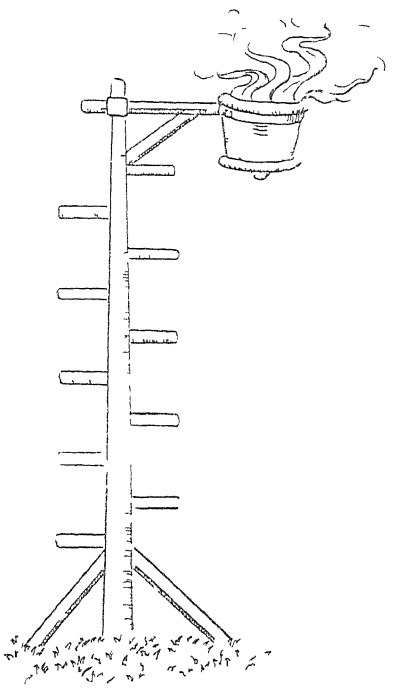

Fig 120 Armada Beacon
Mr Heath Nelward 6

It has been estimated that a signal from the nearest point on the coast through relay points could reach Whitehall in twenty minutes more or less These flaming signals over the length and breadth of England have been magnificently described by Lord Macaulay in his poem *The Armada* Signals of this description were in the nature of an alert as we know it to-day and no code was attempted though as early as 300 B C Polybius mentions signals with three torches and in 1638 Giovanni Battista Porta wrote a treatise on *How to make Signs by Fire* The war rocket was used for short-distance signalling but as far as I am aware, there is no record of any relay system In the war of 1914–18 the Germans used a message rocket which released a parachute attached to a container wherein detailed instructions or information was enclosed

In 1666 that indefatigable inventor the second Marquis of Worcester,[2] devised a scheme

> how at a window as far as eye can discover black from white a man may hold correspondence without noise or notice being made and it is better that a predetermined course be taken by mutual consent of the parties Also a way to do it by plate Linthorn by night though dark is pitch is black

Although Worcester printed his *Inventions*, he was evidently anxious that unauthorized copyists should not plagiarize, and therefore gives no details (Fig 121 (1))

In 1684 Dr Robert Hooke[3] produced an appliance which consisted of a standing frame, on the left hand of which was a black board Behind this were white boards, painted with twenty-four signs each standing for a letter of the alphabet, omitting i and v These could be pulled rapidly forward and backward by string and pulley There were also signs to convey certain messages to the recipient of the signal Hooke considers that his signals would be most useful in sieges (Fig 121 (2))

Something of this nature, but purely an emergency arrangement, was employed in 1689 by the Duke of Gordon when he attempted to relieve Edinburgh Castle A white board signified "All Well," and a black board the reverse Messages were spelled out with black letters on large white boards The distance must have been considerable, as a telescope was used[4]

[1] William Lambarde *Perambulation of Kent* (1596)
1 *Century of Inventions*
[3] *Philosophical Observations and Experiments*, edited by Derham (1726)
[4] *London Gazette*, 1689, Macaulay *History of England*, chapter xiii

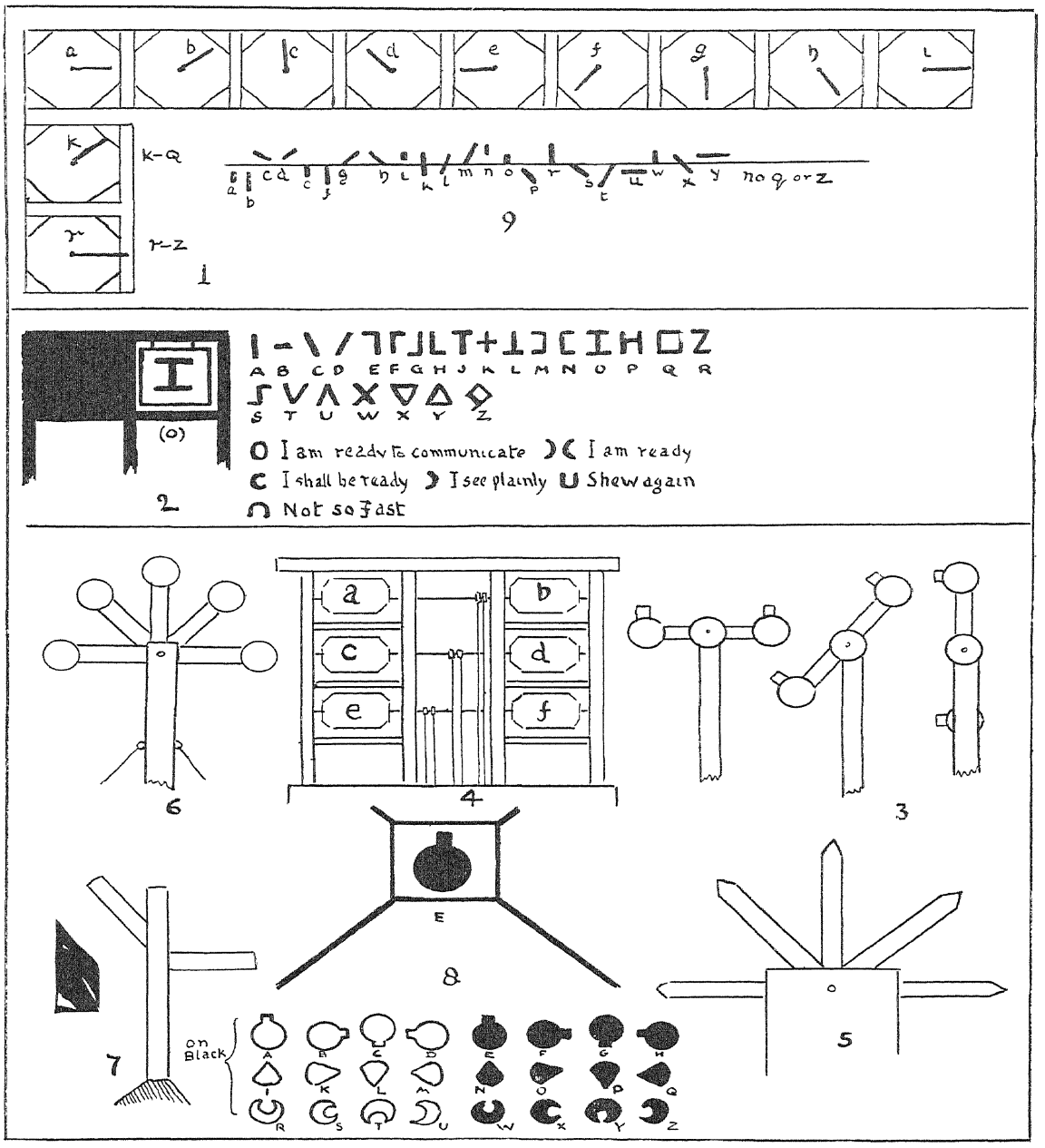

FIG 121 SIGNALS

1 2 Cards (from *A Century of Inventions* by the Marquis of Worcester 1666) 2 signal bell (from *Philosophical Experiments* by R Hooke 1684) 3 Chappe's telegraph (from *Essay on Modern Telegraphic Characters* by Rev J Gamble 1795) 4 Lord George Murray's signal apparatus (from an engraving 1796) 5 Gamble's semaphore 6 Goddard's semaphore (from *Observations on Telegraphic Correspondence* Admiralty 1816) 7 Admiral Sir H Popham's semaphore (from a lithograph circa 1820) 8 Joseph Conolly's emergency signals (Admiralty 1808) 9 the Marquis of Worcester's cypher

Semaphore

In 1792 Claude Chappé introduced the first mechanical semaphore (Fig. 121 (3)) by which letters and words could be sent. He installed twenty-two stations between Lille and Paris, on which were posts with three movable arms. So efficient was the working that the capture of Condé in 1793 was announced in Paris in twenty minutes. Chappe's first name for his machine was the "Tachygraphe," and this was changed later to "Telegraph." Other inventors tried to copy his invention and brought adverse influence to bear on the National Assembly, as a result of which Chappé, broken-hearted and ruined, committed suicide.

In 1796 Lord George Murray, Archdeacon of Man, suggested a very complicated arrangement of shutters which, together with blanks, could make letters and code words. He obtained an audience with the King, George III, and as a result was created the first Director of Telegraphs in the Admiralty, a rather unusual appointment to be held by an Archdeacon. His signal board was set up on the Admiralty at Charing Cross, and an engraving, together with a description of the working machine, was published. Fig. 121 (4).

Apparently there were six boards, pivoted in the centre, painted on each side A–I and G–M, and when these were turned horizontally a blank was shown; thus a combination of letters and blanks could form code words.

There were twenty-four stations about every three miles between London and Portsmouth. Murray retired after five years and was very properly made Bishop of St David's!

Meanwhile other inventors tried to produce simpler forms of the semaphore. The first of these was devised by Richard Edgeworth, who, in 1767, had used some form of semaphore to convey the news of the result of a race from Newmarket to London, possibly an elaborate form of the signalling now used on racecourses by bookmakers' assistants. By 1797 he must have improved upon this apparatus, for at this date he wrote, and printed, a long letter to the Earl of Charlemont, asking for his support in establishing a semaphore "or, as he called it, a "Tellograph"—system between Dublin and Cork at an estimated cost for the 120 miles of £1400 against the £3000 which the Admiralty paid for their system from London to Portsmouth—a distance of 56 miles. He stated that his signals could be read by telescope at fifteen miles, and that a portable set could be made for military purposes. Nothing, however, came of his proposal, in spite of the fact that Napoleon was threatening invasion on the Irish as well as the English coasts.

Four years before this Colonel Congreve,[1] when in camp near Menin, had the two opposite sails of a windmill removed and made signals with the remaining two.

While Edgeworth was vainly attempting to introduce his Tellograph in 1797 the Rev. J. Gamble published an exhaustive history of signalling from the earliest times, with illustrations of his own and Chappé's instruments, and complained that Archdeacon Lord George Murray's cumbersome contrivance was preferred to his own much simpler instrument (Fig. 121 (5)).

In 1803 W. Goddard approached the Admiralty with a scheme similar to that of Gamble, but from his own account this met with a rather curt *non possumus* from the secretariat (Fig. 121 (6)).

In 1803 Admiral Sir H. Popham, one of the compilers of the Naval Code of Signals then in use, produced a simple semaphore of two arms which was erected on the roof of the

[1] Afterwards Lieutenant-General Sir William Congreve, first Baronet, and father of Sir William Congreve, inventor of the war rocket.

Admiralty after Lord George Murray had retired to his well-earned bishopric (Fig. 121 (7)). This, with certain improvements, is the form of semaphore used in the Navy to-day, and forms the basis of flag signalling used also in the Army.

In a test made in 1806 of Popham's semaphores a signal was made between Plymouth and London and acknowledged in three minutes.

In 1808 Joseph Conolly put forward a form of emergency signal for use if the official semaphores were put out of action by storm or invasion (Fig. 121 (9)). This consisted of sheets 7 feet square fixed to lances or sergeants' pikes, kept in position by guy ropes. It could be made by Army engineers for two pounds or by Indian craftsmen for five shillings. A party of general officers tested these signals from New Cross to Shooter's Hill, a distance of three miles, "by the use of six-guinea telescopes"

Electric Telegraph

In 1838 Wheatstone made 'electrical signals' between London and Birmingham, and when certain improvements had made this a practical proposition his invention was officially adopted and the Admiralty semaphores were dismantled.

Field telegraphs were installed in 1854 from Varna to Lord Raglan's headquarters in the Crimea, and the same system was tried out in India.

The Field Telegraph of the Royal Engineers in 1866 consisted of two wire wagons, two office wagons, four miles of wire in half-mile drums, and jointed poles.

Heliograph

Herodotus tells how in 490 B.C. the Alkmæonidæ in Athens (the 'fifth columnists' of ancient times) signalled to the Persian fleet, by the sun on a polished shield, that the moment was propitious for attack; the same method of signalling was adopted at the battle which followed at Marathon, and was also used by Alexander the Great in his campaigns

There were no further developments of this form of signal till Mance, of the Persian Telegraph Department, produced a movable mirror by which signals on a prearranged system of flashes could be transmitted over long distances where sunshine was more or less permament His heliograph was used in India in 1877–78, and in the Afghan and Zulu campaigns of 1879–80. The same system is used in a more elaborate form for night work with electric lighting from batteries

Audible Signals

The great war drums of Africa are, like the smoke signals of the American Indian, probably survivals of a system handed down from the days when primitive man first stretched skin over a gourd or hollow tree-trunk. With a code of varied staccato beats the sound can be heard and relayed over long distances.

The military drum, trumpet, and bugle do not come under present consideration, for they have been used only to convey orders over short distances.

Signalling by bells was practised, like the lighting of beacons in periods of sudden invasion alarm, as early as 1338.[1] It was ordered that no church was to ring more than one

[1] Thomas Rymer, *Fœdera*, II, p 1066

bell under normal conditions, but that on the alarm every bell in every tower and steeple was to be set ringing. Again history repeats itself with the 1940–43 orders respecting church bells.

The maroon used in the last war to give warning of air raids was not very satisfactory, as it was almost impossible to synchronize all the signals, which could only be used in a comparatively confined area.

The siren of to-day on land is merely an adaptation of the naval form of signalling in foggy weather, used in the middle nineteenth-century and since greatly improved by Heimboltz.

Wireless transmitting and receiving is the last and most potent of the audible forms of signal, but we must leave technical writers to deal with this.

Though the very complicated systems of codes do not come within the subject of arms and armament, it is of some interest to realize that these have been in use from prehistoric times, and in more modern ages something akin to the Morse system seems to have been foreshadowed by the Marquis of Worcester (Fig. 121 (1)).

CHAPTER IX

THE BAND

It is not proposed to deal with the military band as such, for this has been fully recorded by J. A. Kappey,[1] H. G Farmer,[2] and Sir George Grove.[3] It is rather the intention to consider the soldier musicians—such as drummer, fifer, and trumpeter—and the parts they played in the organization of the Army.

With the advent of the seventeenth century we have printed regulations and instructions which detail the duties, especially of the drummer, who was a person of some importance. Francis Markham writes "It is the voice of the Drum the souldier should wholly attend."[4] Gervase Markham says that the "Drum" must be "Gentile and of great respect, a good linguist and take notice of such things of importance as shall encounter his eyes and ear,"[5] and Barriffe considers that "the Drum is the voyce of the Commander."[6]

All writers on this subject mention the fact that besides drum-beating the drummer is used for parleys with the enemy under a flag of truce, dealing with prisoners, helping the wounded, and conveying confidential messages, and must therefore possess the qualities of obedience, secrecy, sobriety, valour, and loyalty. F Markham, quoted above, adds, "No gifte or force should cause him to disclose any secrets that he knows." Sir James Turner is not quite so definite, for he considers that if the drummer can "convey a message wittily to an enemy he may be permitted to be a Droll, as Doctors is a thing that is not at all required at his hands."[7] It is, however, insisted that he must be skilful in beating the drum, the calls of which were: "March, troop, battalia, charge, retraite, batterie, and relief."

Nathaniel Crouch, a journalist who wrote under the pseudonym of Richard or Robert Burton, gives a conversation between Sir Roger Williams, author of *A Brief Discours on War*, and Marshal Biron, who was afterwards killed at the siege of Epernay. The Marshal considered that the English drum-march was heavy and sluggish, to which Sir Roger retorted: "Slow it is, but it has traversed your Master's country from one end to the other."[8] Of the kettledrums Sir James Turner writes:

> There is another martial instrument with the Cavalry which they call the Kettledrum, there be two of them which hang before the Drummer's saddle on both of which he beats. They are not ordinary. Princes, Dukes, Earls, Generals and Lieut.-Generals may have them with the troops which are not ordinarily called Life Guards.[9]

The trumpet is dealt with in similar fashion, but the fife is seldom mentioned in these early printed works. Perhaps the reason for this appears in the *Five Decades of Epistles of Warre*—"The Phiph is but onlie an Instrument of Pleasure, not of necessitie"; and again, Turner suggests that the fifer was not essential, for he writes, "In some places a piper [fifer] is allowed for each company," and adds, "A Bagpipe is good enough for them who

[1] *Military Music. History of Wind Instrumental Bands* (1894)
[2] *Memoirs of the Royal Artillery Band* (1904)
[3] *Dictionary of Music and Musicians* (1879–89)
[4] F Markham, *Five Decades of Epistles of Warre* (1622)
[5] G Markham, *Souldier's Accidence* (1643)
[6] W Barriffe, *Militarie Discipline* (1661)
[7] Sir J Turner *Pallas Armata* (1683)
[8] R Burton, *Admirable Curiosities and Wonders of England* (1702), p 4
[9] Sir J Turner, *Pallas Armata* (1683)

love it" The bagpipe is, to say the least of it a controversial instrument whose evolution and history will be more fittingly dealt with by some expert across the border

FIG 122 BAND OF THE ROYAL MARINES 1823

FIG 123 BAND OF THE ROYAL MARINES 1826
From a full length Portrait of Mr Sharp

Up to about the year 1824 the majority of the bandsmen were not attested men There were certainly occasions when the reverse was the case, for in 1770, when the Colonel of the

Royal Dragoons returned 'Music boys' of the band as rank and file, he was ordered to replace them by effective dragoons,[1] and again, in 1824, the same action was taken over the sergeant-master of the band of the Horse Guards, it was stated that "His Royal Highness refuses to sanction any deviation from the Regulations and Usages of the Army"[2]

By the seventeenth century a new rank appears, the 'Drummer-major" Sir James Turner states that though such a rank existed in foreign armies "here at home we acknowledge no such creature," but Sir James[3] had evidently neglected to study records, for, several years before Ward had recorded the drum-major and his duties[4] The drum-major-general appears on official records as early as 1690, but does not seem to have any official standing till 1702, when he was appointed by Royal Warrant[5]

FIG 124 FIFER 1761
From a painting by David Morier

In the Warrants, Inspections, and Reports in the Public Record Office are to be found frequent entries of drummers and trumpeters, the majority of which deal with uniform and equipment Those that are not annotated will be found in Mr Sumner's extracts from War Office Records published from time to time[6] The fifer occurs but rarely in these records There is an interesting note in 1776, when some fifers' are noted in the King's Own Regiment of Horse, and again in 1782 at an inspection of the same regiment it is recorded that "the Trumpeters are mostly fifers" It is rather puzzling to find fifers in a cavalry regiment, even in the band, but the fact that the trumpet, which is the accepted instrument of cavalry, is displaced by the fife requires an explanation which unfortunately is not forthcoming (Fig 124) The hautboy occurs in numerous entries from 1684 to 1751 In 1750, at an Inspection of the 1st Dragoon Guards it is noted that there were no hautboys and that drummers took the place of trumpeters This was changed in 1766, when dragoons ordered trumpeters instead of drummers[7] These must have been kettledrums, but the type of drum is not specified Possibly the side-drum was used when the dragoons paraded on foot

However, the cavalry seem to have done well without music In an inspection of the 1st Dragoon Guards in 1768 there was "no music," and it is shown that this was not a serious matter, for at another Inspection held on April 26, 1773, it is recorded that the men march as well as possible without Music" On the other hand, the Royal Dragoons record in 1774 'trumpeters handsomely dressed and formed a good Band of Music"

As might be expected under the Hanoverian dynasty, many of the musicians of the Army were imported from Germany, and this is supported by an Inspection of May 3, 1776, when the Royal Dragoons' trumpeters were all foreigners

In 1715 Evans's Dragoons paraded at Stirling with "six drummers, Mores [Moors] with bres [brass] drums, and the hobys [hautboys], they roade upon gray horses"[8]

There are frequent references to grey horses for the band in the various War Office

[1] PRO WO 3/25 p 10
PRO WO 3/405 p 284
[2] *Pallas Armata*
[3] R Ward *Animadversions of Warre* (1639)
[4] PRO, SP 44/168 p 405
[5] *Journal of Army Historical Research, passim*
[6] PRO WO 4/80 p 41
[7] A Francis Stewart, *News Letters of* 715 16, p 64
[8]

records of the eighteenth century, but in 1799 the employment of grey horses for trumpeters was discontinued.[1]

The practice of employing coloured men continued in the infantry till 1843. Everard, in his *History of Farrington's Regiment* (the 29th), states that after the surrender of Guadeloupe in 1759 Admiral Boscawen brought over eight or ten coloured boys as a present to his

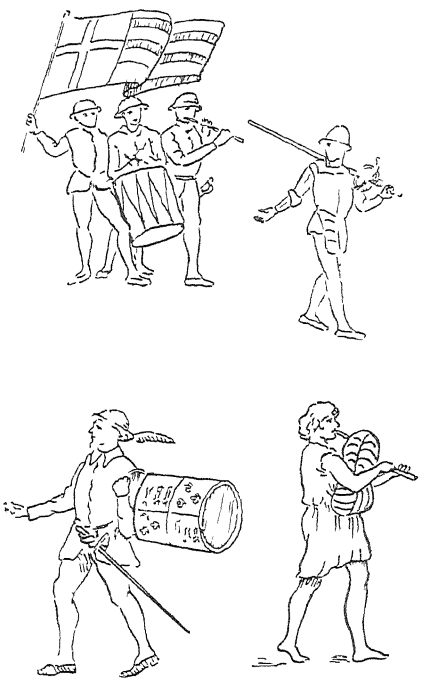

Fig. 125 Drummers and Bagpiper 1540
From a wall painting formerly at Cowdray

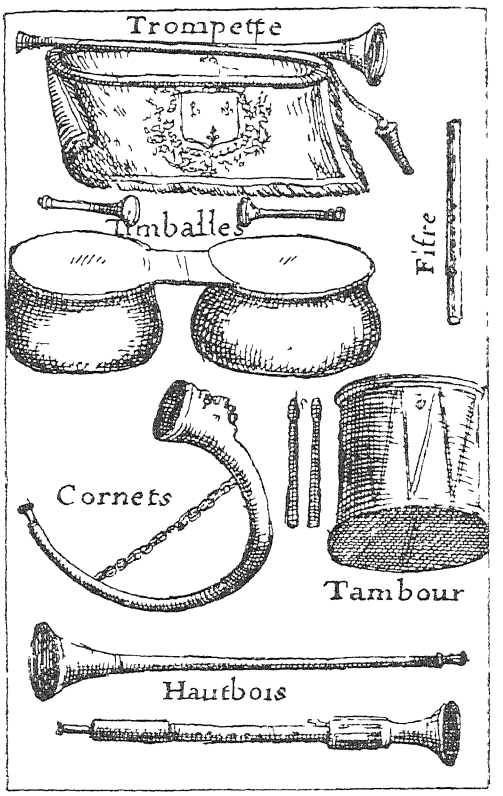

Fig. 126 Musical Instruments 1678
Gaya *Traité des Lunes* (16-8)

brother colonel of the 29th, "thinking they would prove very ornamental as drummers." In 1821 coloured men were "enlisted for the Band" under the authority of the Duke of York, Commander-in-Chief They were mostly employed as drummers, kettledrummers, tambourine players, and wielders of the "Jingling Johnnie" or Turkish bells (Fig. 132).

Instruments

The construction of the drum has changed but little in the last thousand years. It consists of a cylinder of metal or wood over which is strained skin or parchment tightened with zig-zag cords. In later years these cords were attached to hoops, which fitted over the skin, and the cords were adjusted by leather braces. At some period in the seventeenth

[1] PRO, WO 3/330, p 121

century the 'snare' was added. This is a series of fine cords stretched across the lower head of the drum to give increased resonance to the sound. It does not appear on sixteenth-century illustrations, but is clearly shown in Gaya's engraving (Fig. 126), although no braces appear. This author describes the drum of his period in some detail. "Les Tambours sont fait de bois de Chasteigner [chestnut] creux et couverts par les deux costery de peau de veau . . avec un timbre [snare] qui est par dessous."[1] The drum of the early nineteenth century is shown in Fig. 22

FIG 127 KETTLEDRUMMER
From a drawing by Rembrandt
By courtesy of the British Museum

The drum of about 1540 was of large size and was carried on the outside of the left leg; as military operations became more extended the size of the instrument was reduced, and by the eighteenth century the smaller type worn in front was universally adopted, with only the bass drum retained in a large size (Fig 125).

As has been noted above, the French drums were usually of wood, but in the early eighteenth century they were of metal; one of these, believed to have been captured at Blenheim, and now preserved in the Tower of London, bears the French Royal Arms and the words "Régiment de Marine."

These French, and probably German, models of metal were copied in this country, but according to Grose a regulation made in the reign of George II laid down that drums were to be of wood and that the Colonel's arms, with which the metal drums were emblazoned, were to be effaced and the Royal Arms substituted, together with the regimental colour and facings.[2]

The naker, or small kettledrum, is found in illuminations and carvings as early as the fourteenth century, and was used as late as the nineteenth century, when cavalry paraded on foot. It will be referred to again when dealing with the more modern form of kettledrum.

The kettledrum was of Oriental provenance, coming into Europe through the Balkans and Hungary (Fig. 133). Gaya describes it as "deux vaisseaux d'arain, ronds par dessous, dont les ouvertures sont couvertes de peau de Bouc [goat-skin], qu'on fait resonner en

[1] Louis de Gaya, *Traité des Armes* (1678)
[2] Francis Grose, *Military Antiquities*, vol II, p 49.

battant dessus avec des baguettes He adds that formerly the French used only those instruments that had been captured in battle, but that Louis XIV ordered them as part of the equipment of the Ordnance companies (Fig 126

The Warrant reproduced on Fig 129 is the earliest Warrant dealing specifically with drums, and is of interest, as it contains the drum music [1] It is dated 1691-2

Attached to the Warrant is a regulation for the drum banners They shall be of the colour of the facing of the regiment the badge of the regiment or its rank in the centre, the depth to be , feet 6 inches the length 4 feet 8 inches exclusive of fringe

FIG 125 KETTLEDRUMMER From a pastel Drum Rec Ve 11

The spirited drawing by Rembrandt in the British Museum shows the coloured kettledrummer of the seventeenth century and—what is especially interesting—the drum banners Fig 127)

When a regiment of Horse or Dragoons were provided on foot small kettledrums or nakers were carried on the back of a drummer boy These are shown in Sandford's engravings of the Coronation Procession of James II in 1685 and in the Ceremony of the Order of the Bath by Jean Pine in 1730 This practice continued well into the nineteenth century

In the Tower Collection are two kettledrums which for over a hundred and fifty years have been labelled as captured at Blenheim These were used in Westminster Abbey at the great Handel Commemoration performance on May 26, 1784 On March 15 1740 February 27, 1753, February 17, 1756, and March 11, 1762, Mr Handel, through his agent Mr Smith, indented for the Tower Drums for his orchestra, and received them on loan from the Master-General of Ordnance provided he made good all damage They were brought from the Tower by order of the Duke of Richmond, Master-General of Ordnance and placed on the left of the Organ,- and are marked on the programme plan as 'The Tower Drums ' They are described as 'Taken at Malplaquet (Fig 131)

There were three types of drum used the tenor, possibly nakers, the bass the Tower Drums and the double-bass, made specially by Mr Ashbridge, of such huge size that they had to be constructed of copper as no sheet brass of the proper dimensions was available In the Warrant of July 1 1708, it is ordered

> The drums of the Dragoon Guards and Dragoons to be of brass the front or forepart be painted with the colour of the facings of the regiment upon which is to be the badge or rank of the regiment as in the second guidon The banners of the kettledrums[3] to be of the colour of the facing of the regiment with the badge of the regiment or its rank in the centre as on the second standard

Contemporary representations of kettledrummers show the reins on the horse's neck which presumably involved the drummer's taking a bar's rest when wheeling his horse to right or left The modern drummer gets over this difficulty by attaching the reins to each stirrup iron and guiding with his feet

The drums of the Ordnance—that is, the Train of Artillery—were borne on a carriage drawn by four white horses in 1689, and the carriage with its drums was shown with

[1] From the original preserved in Kneller Hall.
[2] C Burney *Account of Musical Performances* 1784 *in Commemoration of Handel* and P R O W O 47 34 pp 41, 47 59
[3] Grose gives an illustration of kettledrums, presumably of this date (1786)

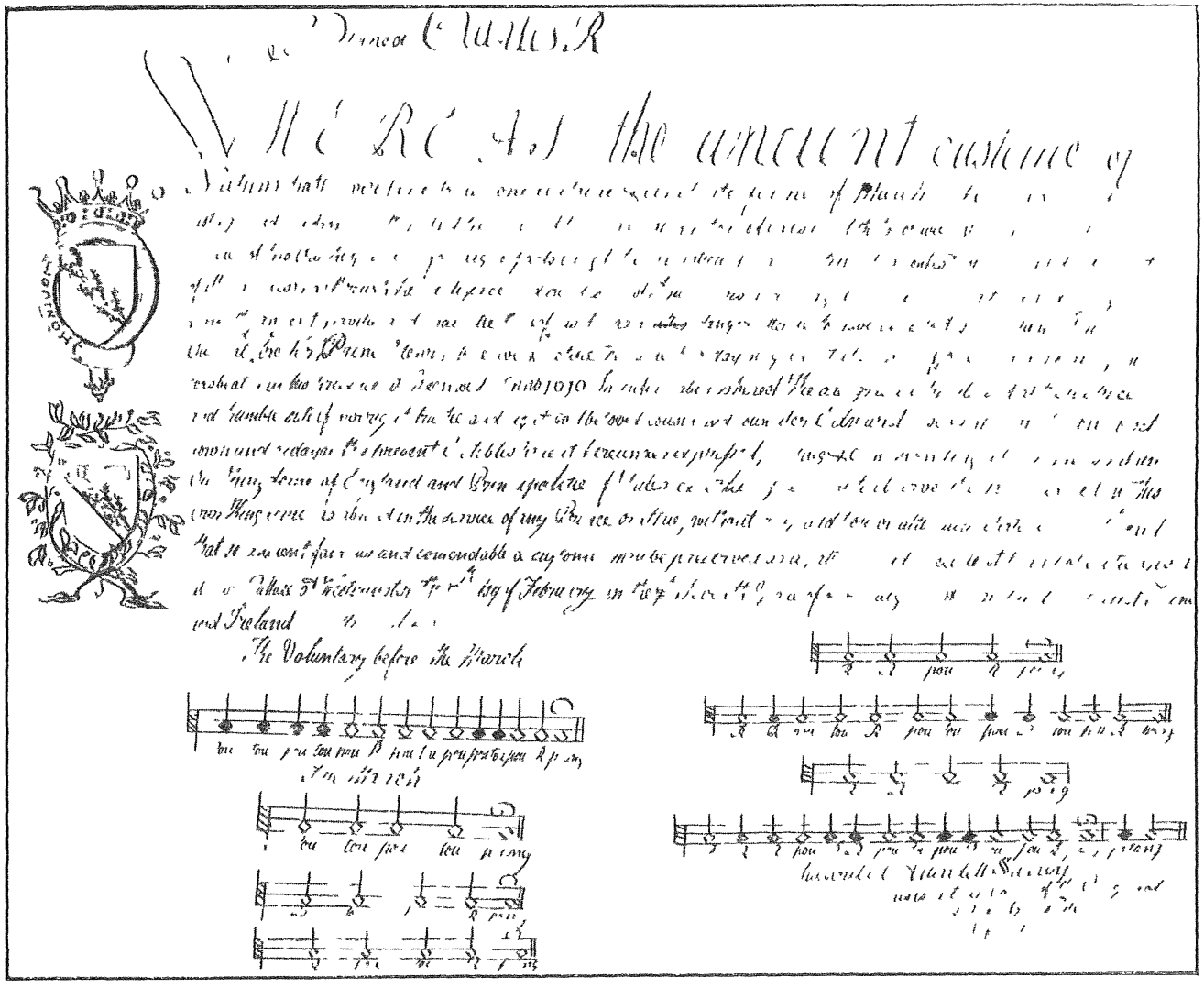

FIG 129 WARRANT ORDERING DRUM BEATS 1631 30
From the original at Knelle Hall

Marlborough's Train of Artillery in the Tower until 1841, when it was destroyed by fire. Fortunately a contemporaneous scale model had been made which is now preserved in the Armouries with other models of the Train (Fig. 130).

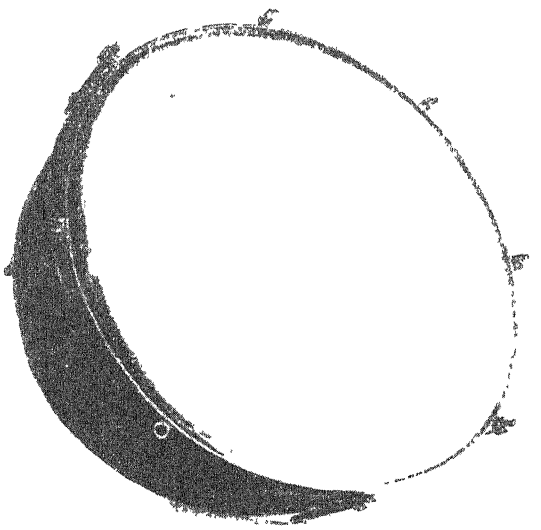

FIG. 130 BLENHEIM DRUM
Tower of London

In 1747 a regimental order of June 19 directs that "to mount the kettledrum carriage every night half an hour before sunset to beat till gun firing."[1] Farmer states that the carriage was abolished in 1759.

The trumpet of the seventeenth and eighteenth centuries changed but little in design. Gaya describes it "d'airain doublement courbé" (Fig. 126). In the Warrant of Charles I, referred to above, it is described as of brass with crimson cords mixed with the colour of the regiment, the banner to be twelve inches in depth and eighteen inches in length, of the colour of the facing of the regiment ensigned with the King's Cypher and Crown. In the Warrant of December 19, 1768, it is laid down that the trumpets have crimson and blue cords. In the Standing Orders of the 2nd Dragoon Guards in 1795 it is laid down that the trumpet should be slung over the right shoulder with the bell uppermost. At the end of an inspection by a general officer the trumpets were to sound "God Save the King," but this could not have been played by the simple

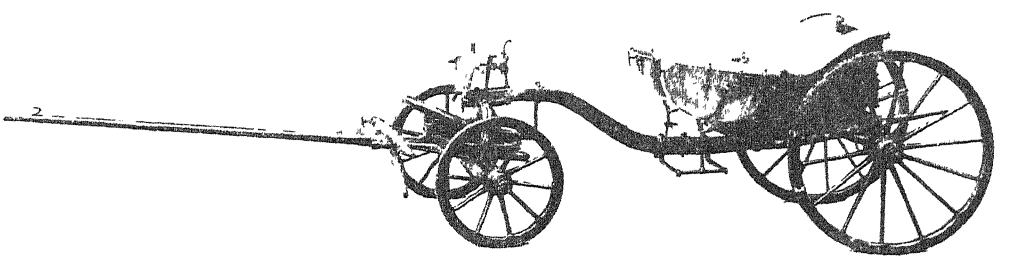

FIG. 131 DRUM CHARIOT OF THE ORDNANCE, CIRCA 1747
Formerly with the Tower Armouries

trumpet, which would need a slide or valves for such a purpose; it was possibly a general or royal salute that was sounded.

[1] H. G. Farmer, *Memoirs of the Royal Artillery Band*

In 1761 we have a list of six trumpets, six crooks, six sets of pieces, one French horn, two crooks, and three shanks—which we must leave to the musical expert to explain.

The fife and hautboy need little explanation, as they are clearly shown in Figs. 124, 125, 126, the fife being one of the most primitive of wind instruments, and the hautboy, called to-day the oboe, an arrangement of split reed embodied in the wooden pipe The only entries in the War Office records that mention these instruments deal rather with the performers as part of the military band.

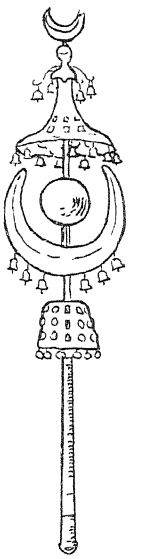

FIG 132 "CHINESE HAT," EIGHTEENTH CENTURY

In the eighteenth century the "Chinese Hat," or "Jingling Johnnie," appears, copied directly from a Turkish instrument which was used as a rallying point in action (Fig. 131). Its use was discontinued in the middle of the nineteenth century, and the only band which carries a modern version of this instrument is the band of the Royal Marines at Deal, which includes the lyre-shaped Glockenspiel, or metal xylophone, ornamented with horse-hair loops and the regimental badge.

The drawings by George Scharf, father of Sir George Scharf, first Director of the National Portrait Gallery, give valuable information as to the musical instruments and uniforms of bands in the British Army in 1825 and 1826. Scharf was born in 1788, joined the British Army in 1814, and was present at Waterloo. When quartered at Woolwich he made drawings of the band of the Royal Marines, the earlier, dated 1825, showing the white uniforms, and that dated 1826 the change to the blue tunics which was ordered in this year (Figs. 122, 123).

FIG 133 KETTLEDRUMS, 1840

The instruments represented are the bass drum, the fife, side drum, cornet or keyed bugle, French horn, trombone, and ophicleide, which was introduced early in the nineteenth century. On the ground is a 'serpent,' which had been introduced at the end of the previous century, and became popular not only in military bands but also in village churches. The drum near to the serpent is a bass drum, as the royal arms are painted horizontally. The drawing dated 1826 is of interest, because the coloured drummers, or 'black-amoors,' seem to have been given up at this period; the white bandsmen, however, still wear the quasi-Oriental turbans and shell jackets. The bass drum, an unwieldy instrument at best, the carrying of which on the march must have been a difficult and strenuous operation, is here shown as a side drum. On the left of the picture is a man carrying a single 'naker,' or small kettledrum, which is a very rare representation of this instrument. The last occasion when it was used is shown by a coloured engraving of the Coronation procession of Queen Victoria, on which a drummer of the Household Cavalry beats a naker carried on the back of a boy (Fig. 133).

Weapons

In 1643, according to Markham's *Souldier's Accidence* p. 39), there is a suggestion that the trumpeter was considered to be a non-combatant "He is not bound to any armes at all more than his sword, which in former times was not allowed but with the point broken." In several of the Inspections and Warrants in the Public Record Office drummers' swords

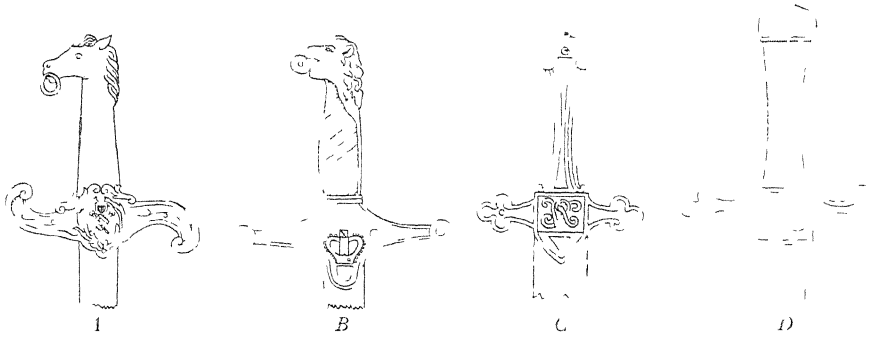

FIG. 134 BAND SWORDS
A and B eighteenth and nineteenth century C and D (?)
From the Tower Armouries

are mentioned, and by 1767 the trumpeters were evidently considered to be combatants, as in the Dragoons they were each ordered one pair of pistols [1]

In 1735 we find scimitars included in the equipment of the drummers of the 8th Dragoons, and the same weapon is allotted to the trumpeters of the 1st Royal Dragoons in 1777. There are several entries in the War Office papers in the Record Office of drummers' swords for the infantry, but no specification is given

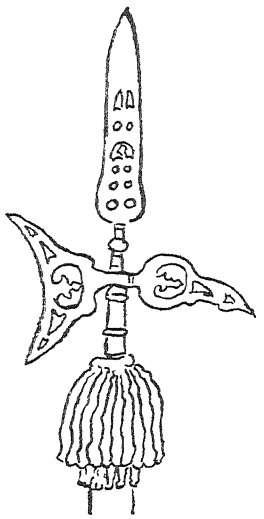

FIG 135 DRUM MAJOR'S HALBERD OF THE OXFORD UNIVERSITY VOLUNTEERS, 1878

The sword shown in Fig. 41 is described in the volume of *Army Equipment*, Part VII ("Hospital Service") (1866), as "Drummer's (old pattern)" issued to the Army Hospital Corps. It is very similar to many of the infantry privates' swords of 1751, and has some resemblance to the fifer's sword in Hogarth's *March of the Guards to Finchley*, painted in 1750. The scimitar blade spread from the cavalry to the infantry, and in 1781 a Warrant describes the drummer's sword as "a short sword with scimetar blade." The Tower collection includes a number of such swords, some with lion-head, others with horse-head, pommels or with 'Mameluke' hilts. The lion-head pommel was carried by the Royal Scots, and the 'Mameluke' hilt by the King's Own Scottish Borderers. In some cases the hilts are decorated with thistles, obviously for Scottish regiments, and the horse-head is either for cavalry or possibly for the King's Own (8th) or for some other regiment which bore the Hanoverian Horse as a badge. An appreciable number of these swords bear "Oxford Militia" on the hilts. Drummers' swords with lion-head pommels are shown in Hull and Englemann's lithographs of 1829.[2]

[1] PRO, WO 3/1, p 30.
[2] *Costume of the British Army* (1828–30)

About the year 1850 a new sword appears, but up to the time of writing no definite order for its adoption has been discovered. The hilt design is based on quasi-architectural motifs and the ears are marked "V.R.," the blade being short and wide (Fig. 134*C*). There was either a shortage of blades or scabbards in the early years, or commanding officers of conservative tastes still clung to the scimitar, for several of the new pattern hilts are found with the old curved blade.

The hilts of the drummers' swords were of brass, and those of the buglers of steel. In 1895 a simpler hilt (Mark II) was adopted (Fig. 134*D*), also in brass and steel, and the old pattern was declared obsolete.

There is an entry in the *List of Changes* of 1901 (9019) wherein it is ordered that all drummers' swords are to be sharpened before going on service. As this was during the Boer War, when no hand-to-hand fighting was to be expected, it would be of interest to know what prompted this order.

In 1903 buglers' swords were declared obsolete, and the drummer's sword was carried only by the bands of Guards regiments in full dress. The bands of the other regiments carry the sword bayonet, as all the bandsmen are enlisted soldiers.

The piper's dirk, Mark I, was ordered in 1871, and a less ornate pattern, Mark II, superseded the earlier design in 1902.

Beyond the reference to scimitars in the eighteenth century records there are no specifications of the swords of cavalry bandsmen until we come to 1882, when the *List of Changes* (4052) gives the sword of the Household Cavalry band as 34⅞-inch blade in place of the long 38⅞-inch blade of the trooper.

The drum-major's staff, purely a wand of office and merely in its shape suggestive of a club or the 'Holy Water sprinkle' of the sixteenth century, dates from the seventeenth century, as instanced by the staff of the Honourable Artillery Company, which bears the date 1671, and was presented in that year by Sir Matthew Andrews, president of the Company.

Oxford, ever the "home of lost causes," clung to the halberd well into the nineteenth century, though it had been declared obsolete in 1799. Possibly the first University Volunteers, founded in this year, adopted it. The present writer remembers seeing it flourished by a gigantic drum-major in 1878, when the Volunteers were equipped as Rifles. When the uniform was changed to scarlet and the Volunteers were attached to the Oxfordshire and Buckinghamshire Light Infantry, the halberd was relegated to a loft, rescued thence in 1912, and placed in the Drill Hall, where it is presumed to be at the present day. (Fig. 135).

CHAPTER X

TANK AND ANTI-TANK

TANK

Shock Tactics

As soon as armies were disciplined, and as such overspread Europe and parts of Asia on conquest bent, the value of shock tactics was very soon realized when fighting against unorganized hordes of barbarians. These shock tactics were employed by the mounted heavy-armed knights in the fifteenth and sixteenth centuries; but long before this another factor came into being. Surprise when combined with weight often turned the scale of the battle. In our own time the combination of weight, surprise, and mobile fire-power is so well known that there is no need to do more than refer to technical works on the subject.[1]

Though the elephant can only be described as a vehicle by stretching the meaning of the word somewhat, it certainly was important when used against indifferently armed infantry, both by reason of its weight—about six to eight tons—and also because it was at one time entirely unknown in Europe, and its appearance in battle bordered on the supernatural.

In 280 B.C., according to Plutarch,[2] Pyrrhus brought over fifty elephants from Carthage to Italy, and, using them in the final charge at Heracleia, sent the Romans in a confused rout across the river Siris. Polybius describes how Hamilcar, some twenty years later, employing seventy elephants at the Bagradas, near Carthage, defeated another Roman army with great slaughter. At a later date the Spartans made defences against elephants by sinking carts up to the axles.[3] Elephants were again brought by Antiochus IV against Judas Maccabæus about the year 170 B.C. "Two and thirty of them," "all exercised in battle," were equipped with wooden towers, each of which held thirty-two men.[4] We hear no more of elephants in battle till the year A.D. 163, when Julius Polyænus[5] makes the astonishing statement that Cæsar used an elephant armed with iron scales and a turret full of archers and slingers in his conquest of Britain. As Cæsar makes no mention of this unusual form of attack we may assume either that Polyænus was romancing or that he was confusing Cæsar's expedition with those of Pyrrhus and Hamilcar.

Evidently these attacks must have been unexpected, for the use of the tribulus or caltrop, which was well known in these times, might have turned the scale in favour of Rome by stampeding the elephants (Fig. 150)

And now we must turn to wheeled vehicles used for attack, apart from those used only for defence. We may pass over the chariots of Assyria, Egypt, and Greece, as these were only employed for conveying heavily armed warriors into battle, where they dismounted and fought, returning to their chariots, if need be, for retreat or flight.

[1] Major-General J. F. C. Fuller, *Tanks in the Great War, 1914–18* (1920). D. G. Browne, *The Tank in Action* (1920).
[2] Plutarch, *Lives*, translated by G. Bettany (1886), pp. 113, 119.
[3] Polybius, *The Histories*, translated by W. R. Paton (1922), vol. i, p. 205.
[4] Maccabees I, vi, 30–38; Maccabees II, xiii, 2.
[5] Polyænus, *Strategemata*, translated by R. Shepherd (1793), Book viii, 23, section 5.

Scythe Chariots

The favoured method was to equip the chariot with great scythe blades, either revolving with the wheel or fixed to the axle. It will be obvious that if these were used in large numbers good organization and careful driving were necessary, for, as Leonardo da Vinci says in his notes to a design for such a machine, "they cause no less injury to friends than they do to enemies."[1]

The first account we have of these 'drephanephoros' (scythe-bearing) chariots is given by Xenophon, writing about the year 400 B.C.,[2] who describes them as used by the Persians. Next in order of date is the account of the invasion of Judæa by Antiochus in 170 B.C., when three hundred chariots, "armed with hooks," were used against Judas Maccabæus[3] in addition to the elephants mentioned above.

Cæsar[4] describes the chariots of the Britons as follows. "First of all they drive in all directions and hurl missiles, so that by the mere terror that the teams inspire and by the noise of the wheels they generally throw the ranks into confusion." Surely if scythes had been used on the wheels Cæsar would have added this detail and would not have referred only to the noise of the wheels. It should be remembered that iron in those days was a valuable metal, and it is more than probable that the Britons had only sufficient for swords and staff weapons, and could not afford the large amount which would have been needed for scythes for their chariots.

Livy[5] describes the chariots used by Eumenes when he defeated Antiochus II, *circa* 261 B.C., as having great scythes on the axles and on the sides of the yokes. He also speaks of spears projecting ten cubits—that is, about 15 feet, from the yoke. This extraordinary statement has been questioned by several writers, one suggested explanation being that the measurement refers to the length of the pole and spear together. At the same time, Livy writes definitely "*ab jugo* decem cubita extantes velut cornua." It should be remembered, however, that Livy was writing in a period very near to the Christian era, describing events that happened nearly three hundred years before. Producers of encyclopædias, illustrated histories, and great, so-called, historical paintings have all given Boadicea scythe-wheeled chariots, and it must be left to classical archæologists to decide whether or not they are correct. I am inclined to think that the verdict would be "Not guilty," or, at any rate, "Non proven."

Silius Italicus,[6] who wrote between A.D. 60 and 70, describes the inhabitants of Thule, which we take to be Britain, as using a chariot fitted with scythes (*covinus falcifer*), and Frontinus[7] (A.D. 80) states that Sulla defended his infantry with stakes against the scythe-bearing chariots of Archelaus, *circa* 86 B.C. The illustration given on Fig. 159 shows these stakes being erected, and the following page shows the chariots entangled in the stakes. The whole page is too confused for reproduction, and the scythes are not clearly indicated. The same type of war-cart is described by Quintus Curtius, writing in the first or second century of our era, who also mentions scythes or sword-blades fixed to the yokes of the horses.

The use of scythes or sword-blades on vehicles of later date will be found noted under the following headings, ranging from the fifteenth to the nineteenth centuries.

[1] *Notebooks of Leonardo da Vinci*, edited by C. Ravaisson-Mollien, II, B. 10.
[2] Xenophon, *Anabasis*, I, 7, section 10
[3] Maccabees II. xiii, 2
[4] Cæsar, *De Bello Gallico*, translated by H. J. Edwards (1919), IV, 33
[5] *Various* (1828 edition), XXXVII, 41.
[6] *Punica*, XVII, 416, 418
[7] S. Frontinus, *Strategematicon* (1607), IV, ii, 3.

The Ribaudequin

The next type of vehicle used in attack is known as the 'Ribaudequin.' According to Du Cange,[1] these were originally large siege cross-bows on carriages, to which were added pikes and blades. Froissart[2] describes them as "high wheelbarrows reinforced with iron and long pointed spikes in front," which he states were first used in 1382 by the men of Ghent. The well-known *Chroniques d'Angleterre* and illustrated copies of Froissart do not show these

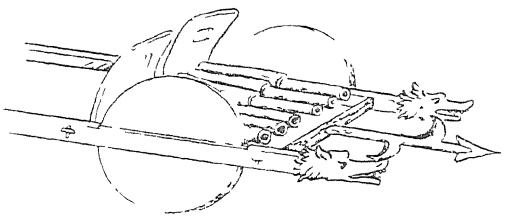

FIG. 136 RIBAUDEQUIN, THIRTEENTH CENTURY
Bib. Nat. Paris, MS. 2643

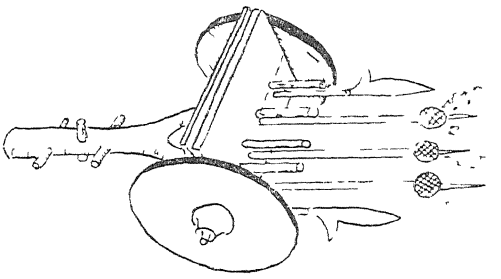

FIG. 137 RIBAUDEQUIN, 1503
Hanzelet, *Pyrotechnie*, p. 636

contrivances, but there are so many representations of the ribaudequin of the fifteenth and sixteenth centuries that they must have been well known at these periods. A fifteenth-century woodcut preserved in Vienna shows one of these carts, horse-drawn, with the sword-blades on the yokes as described by Quintus Curtius (Fig. 138). Another engraving, by Nicholas Glockendon, of Nuremberg, 1503, has the addition of guns, which are also shown, with torches, in Hanzelet's *Pyrotechnie* (1630), which the author considers to be the type described by Froissart (Figs. 136 and 137).

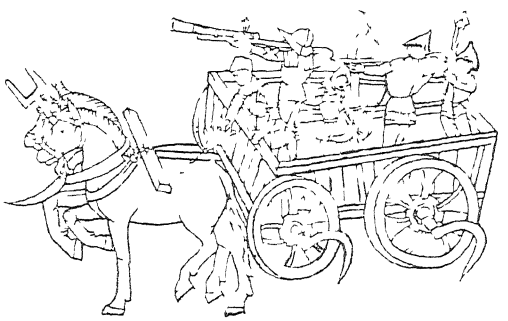

FIG. 138 BATTLE-CAR, FIFTEENTH CENTURY
Codex Germanicus Vienna 734

Leonardo da Vinci[3] invented a complicated machine in which the blades revolved as the chariot moved (Fig. 143). There are two illustrations of this, one in the British Museum (reproduced herewith) and the other in the Turin Library, where the scattered legs and arms show the carnage which the designer considered would be the result of the use of such a weapon. We shall find scythe-bearing wheels on Cowen's battle-car of 1855, shown in Fig. 146 and described later on.

The latest of these battle-cars, and one certainly copied from an actual example, was depicted on the great wall-painting of the siege of Boulogne, 1544, at Cowdray, which was fortunately engraved by the Society of Antiquaries shortly before it was destroyed by fire (Fig. 139). They were evidently used in Scotland in the fifteenth century, as Acts of James II and James III mentioned "Carts of Weir and in elk carts twa gunnis and ilk ane to have twa chalmers [chambers] and an cunnand [cunning] man to shute theme."[4]

[1] *Glossarium* (1678)
[2] *Chronicles* translated by Lord Berners (1523), Book II, 205
[3] *Notebooks of Leonardo da Vinci*, edited by Ravaisson-Mollien, II, B 10, p. 83
[4] Robert Henry, *History of Great Britain* (1781)

They continued in use for over fifty years, and were apparently more elaborate in construction In 1523, when John Stewart, Duke of Albany, made an unsuccessful attack on Wark, Queen Margaret wrote to the Earl of Surrey, Warden-General of the Scottish Marches, on September 29· "The Duke has shields on wheels with artillery in large numbers and each has two sharp swords before them."

On October 19 Sir William Bulmer wrote to Surrey that a spy informed him of these carts, but at first Surrey doubts the report. However, on the following day another spy reports "a cart covered with steel and brass, each with eight guns and men, each cart carried by barded [armed] horses and goeth backward."[1] The illustration from Ludwig von Eyb's work on fortifications and battle-cars shows clearly how the horses at a moment's notice can be reversed to draw the cart out of action (Fig 140)

Both Grose[2] and Newton[3] give illustrations

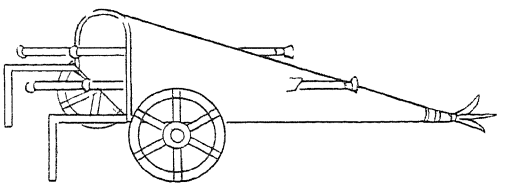

FIG 139 BATTLE-CAR, 1544
From a wall painting formerly at Cowdray

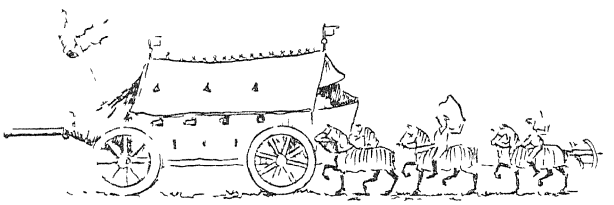

FIG 140 BATTLE-CAR, CIRCA 1520
From a German engraving by Ludwig von Eyb

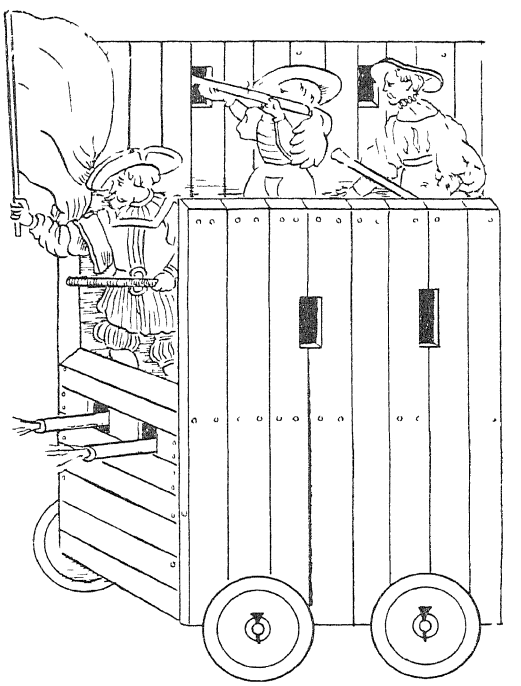

FIG 141 BATTLE-CAR, 1530
Valturius, *De Rei Militari*

of armoured cars, but as they are not based on contemporary illustrations they cannot be accepted as evidence, and are merely the suggestions of eighteenth-century antiquaries.

We now come to the moving fortress equipped only with guns.

Battle-cars and Tanks

The illustration given by Valturius (*De Rei Militari*, 1530) shows such a machine, propelled probably by men in which the armament is solely cannon and hand guns (Fig. 141), and a similar, but more elaborate, contrivance is given in Holzschuher's print of 1558 (Fig. 142). The original shows the car surrounded by troops—horse and foot. The great Triumph of Maximilian, by Burgmair, shows many elaborate cars with various arrangements

[1] P R O , S P Dom (1523), 3368, 3446, 3451
[2] *Military Antiquities*, vol 1, 407
[3] Vitruvius, *De Architectura* (1771).

of handles, cranks, and levers, by which they are moved by man-power alone but all of these are purely for pageant and not for military purposes

And now we come to the tank as we know it to-day This was designed about the year 1500 by Leonardo da Vinci (1452 1519), the most remarkable creative artist in the whole of history In the realm of art he produced colossal statues and his paintings are outstanding masterpieces which never have been and never will be equalled He was a profound mathematician and invented water-mills paddle-wheels for boats breech-loading cannon the swimming-belt the smoke stack and the mincing-machine He was interested in magnetic attraction and steam as a motive power he fortified towns and made many experiments in the problem of flying The illustration on Fig 143 shows a mechanical scythe-chariot and also his tank, which it should be noticed is made with a perfectly smooth

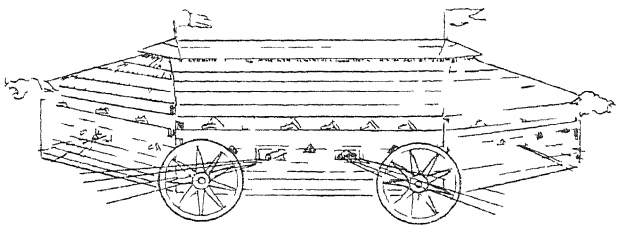

FIG 144 [illegible]
[illegible]

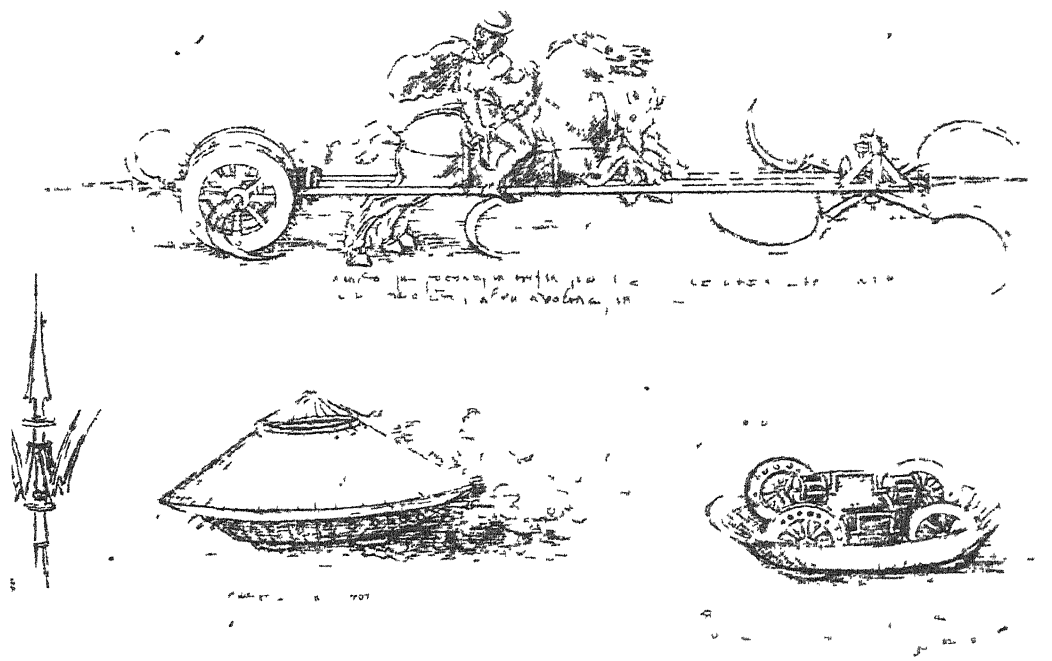

FIG 143 SCYTHE CHARIOT AND BATTLE CAR BY LEONARDO DA VINCI
From the British Museum

cover to deflect bullets One very rough sketch in the Institut de France (B 10) shows horses as the motive-power, but the more careful drawing in the British Museum (Fig 143) shows an arrangement of geared wheels and crank handles for use by man-power alone He describes[1] it as follows 'These take the place of elephants, and one may hold bellows

[1] *Notebooks of Leonardo da Vinci* edited by Ravaisson Mollien II B 10, p 83

in them [possibly for smoke or for sound apparatus] to terrify horses or one may put carabiniers in them ' He also writes that it takes eight men to work the motive-power, and adds This is good to break up the ranks of the enemy but it must be followed up ' a dictum which will be endorsed by every staff officer of the present day

The drawing of an arsenal by Leonardo reproduced in the frontispiece was probably made in an arsenal with which he was intimately connected It is of interest as showing that in Italy at that period large breech-loading cannon, almost identical with the Dardanelles gun were in general use for siege purposes

Leonardo never suffered under the difficulties experienced by such great artists as Michael Angelo and Cellini, for princes and patrons could not afford to quarrel with a man of such outstanding ability In 1516 Francis I persuaded him to go to France, where he was treated like a prince and died in the King's arms in 1519

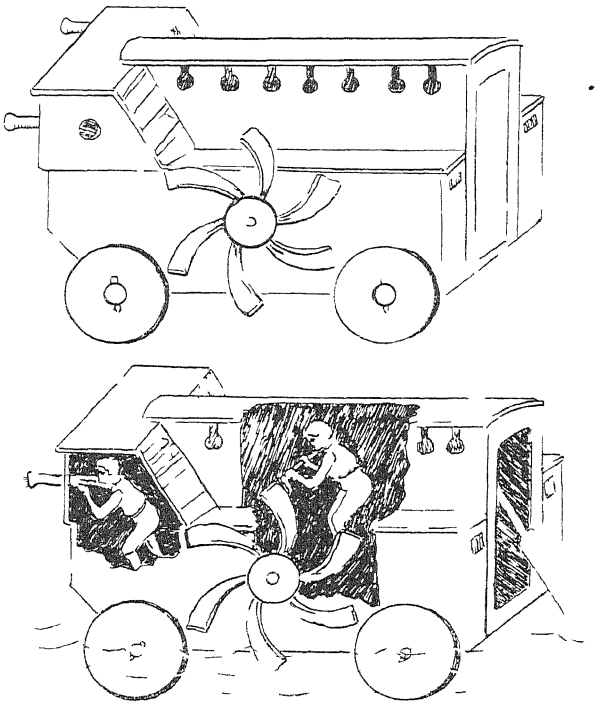

FIG 144 RAMELLI'S AMPHIBIOUS BATTLE CAR 1588
From an engraving by Agostino Ramelli

An inventor working on much the same lines as Leonardo was Agostino Ramelli (1531–1600), who, in 1588, produced a large illustrated work on engineering[1] which included hydraulics, bridge-building, gun-carriages, cross-bows, and an amphibian battle-car worked by man-power

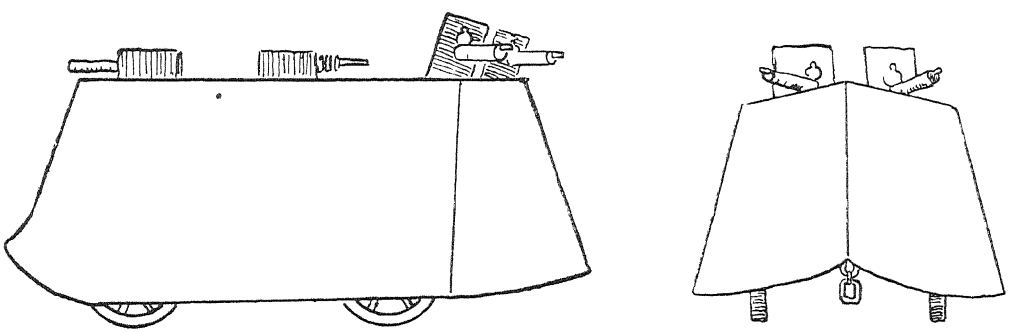

FIG 145 SIMMS AND VICKERS MACHINE CIRCA 1902

He describes it as a water-tight, covered cart containing four or six arquebusiers (Fig 144) He was chief engineer to Giacomo de Medici and to Henri III of France

[1] *Le Diverse et Artificiosi Machine* (Paris 1588), fol 250

It is somewhat remarkable that at least four books which deal with the genesis of the tank give this illustration under the date 1755. A reproduction of the whole page of the engraving is given in the *Journal of the Royal Tank Corps* for March 1939.

In 1596 John Napier, or Napeir, the distinguished mathematician produced a remarkable engine of war which is described as "a round chariot of mettle double musket proof" motion of which

> shall be by those that be within the same more easie and more speedie than so many armed men would be otherwise. The use thereof in moving serveth to breake the ranke of the enemies battle by continuall discharge of harquebusses through small holes the enemy being abashed and uncertain as to what defence or pursuit to use against . . . "mouth of metal".[1]

Mark Napier gives further details of this invention:

> He had the skill to frame an engine which by virtue of some secret springs . . . which with other implements . . . enclosed within the bowels thereof had the power . . . to clear a field of four miles circumference, of all the living creatures exceeding a foot of height . . . he made it appear that he was able with the help of this machine alone to kill 50,000 Turks without the hazard of one Christian. It is said that . . . he gave proof upon a large plain in Scotland, to the destruction of a great many herds of cattel and flocks of sheep whereof some were distant from other half a mile . . . and some a whole mile.

In a later note he adds that "It seems that these instruments of destruction should be kept secret unless necessity should arise."

Here is another of those problems with which inventors have intrigued us from the days of the Greek fire of Porphyrogenitos, the mysterious poisoned armour of the Borgias and the Earl of Worcester's experiments at Whitehall. Napier was a respectable mathematician, the constructor of logarithms, and author of religious pamphlets besides being an inventor. What was the method by which he proposed to destroy 30,000 Turks? Did he actually experiment on herds of cattle and sheep, and why did he stipulate that the object of his attack must be over one foot high? We can hardly accuse Napier of deliberate falsehood, but if his scheme got beyond a mere idea roughed out on paper it would be of the greatest interest to have even the slightest hint as to his methods. They can hardly have been gun-power, for artillery was still in an experimental stage. Possibly he had some idea of a combination of rocket and Greek fire which might well wipe out herds of cattle if properly applied, but his circumference of four miles and a radius of one mile make one wonder if his logarithms had gone to his head.

David Ramsay, the royal clockmaker, is credited by some writers with the invention of battle-cart in 1634, but a search through his patents of 1635 (No. 68) reveals no more than suggestions for a plough and schemes for moving ships and vehicles, with no details.

In 1693 J. Austen and F. Ball took out a patent (No. 316) for

> a machine or chariot of Artillery which is Musket Proofe and soe contrived as to hold two falkonetts or small field pieces and two hand mortars to be used by the party sitting in the chariot and may be conveyed many miles a day with great ease and expedition which hath been seen and approved.

Unfortunately there is no drawing attached to the specification.

[1] Mark Napier, *Memoirs of John Napier of Merchiston* (1834 edition), pp. 245, 247, 248. Also Sir Thomas Urquhart, *The Jewel* (1652, 1834 edition), p. 219. The original is in the Lambeth Palace Library.

In 1760 Gabriel Bodenehi produced a gun-carriage propelled by foot-power, but as his was not covered in, and carried only a gun of very large calibre, it does not come under present consideration

Farrier de Cugnot experimented with some kind of steam carriage in 1765, but this was very similar to Bodenehi's machine

The next patents are for "Rifle carriages," the first of which by F S Thomas in 1854 (No 479) was fitted with ninety-five rifles, and these were followed by similar machines by Sir J Lillie, 1854 (No 1599), and S A Goddard, 1858 (No 17), all depending on steam for their motive-power In 1855 James Cowen took out a patent No 747) for a Locomotive Battery for Field of Battle with steam engine" (Fig 146) It held fourteen-pounder carronades, and the framing had strong, powerful blades (scythes), hinged when not in use, to mow down any troops that came in contact with it The cover was of

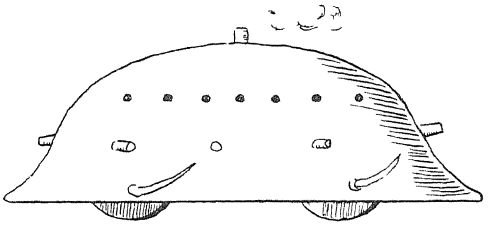

Fig 146 Cowen's Locomotive Battery

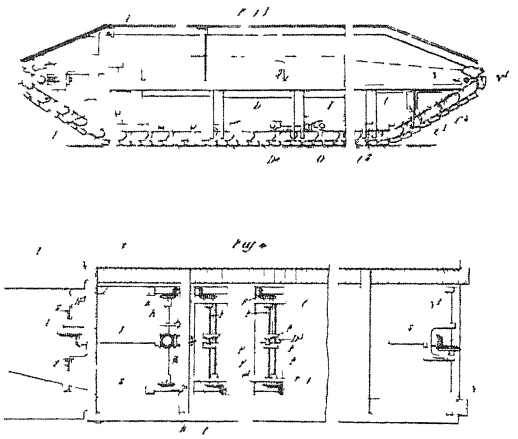

Fig 147 Corporal Moll's Tank 1912

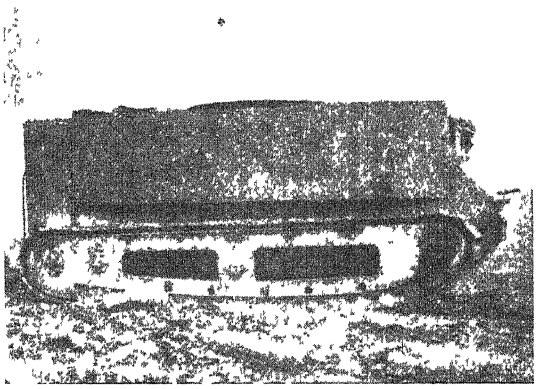

Fig 148 Little Willie, the First Experimental Tank 1915

hardened steel, serrated or formed in sharp angular projections, to shatter any shot that might strike them This is a direct opposite of the 'glancing surface' which was one of the noticeable features of the best defensive armour, and is still observed in the helmets of 1915 pattern and the battleship turrets of the Navy The shape of Cowen's covering, very similar to that of Leonardo da Vinci's, was good, and would probably have been more protective if it had been left smooth Cowen took out several patents for agricultural machines, but does not seem to have made a model of his experimental war-cart

With the coming of the internal-combustion engine of later date the motive-power was simplified, and Simms, in conjunction with Vickers, produced a machine armed, apparently, with machine-guns (Fig 145)

After this it is probable that many inventors put forward schemes which culminated in

the real tank which L. E. Mole, corporal in the 10th Australian Battalion, designed in 1912. It is stated that this was submitted to the War Office, but whether it was the foundation on which the war-time tank was based is for the experts to decide (Fig. 147).

At any rate, the whole question was considered very thoroughly from various angles, and on September 15, 1915, an experimental model, familiarly known as 'Little Willie' (Fig. 148), was produced, from which by degrees the Mark I tank was evolved (Fig. 149).

FIG 149 MARK I TANK WITH ANTI-BOMB ROOF AND 'TAIL,' 1916
By courtesy of the Imperial War Museum

It is an over-worn truism to say that history repeats itself, but here the wheel has certainly turned full circle; its turning, however, has been effected by the substitution of petrol for man-power.

ANTI-TANK

Palisadoes and other Defences

When men first organized armies of cavalry and infantry the value of shock tactics, especially against ill-armed and often undisciplined troops, was considered to be of the greatest importance; for then, as now, it was the infantry which in the end was the deciding factor on the occupation of captured territory.

The foot-soldier, therefore, began to devise defences against this form of attack; at first with staff weapons, which culminated in the eighteen-foot pike, whose main purpose was to provide cover for the musketeer during the lengthy process of reloading. But, in

addition to these weapons, other methods were adopted which saved man-power and were often most effective in the results obtained.

It will simplify matters if these contrivances are dealt with under their respective headings, irrespective of date, for they overlap each other in a surprising manner.

The Caltrop, Tribulus, or Crowsfoot

This device consisted of four spikes, anything from four to eight inches long, so arranged that however it is thrown down one spike is always uppermost (Fig. 150). The British Museum exhibits a caltrop of bone excavated in the Crimea which is dated in the fifth century B.C., and also iron caltrops (tribuli) of Roman provenance. They are mentioned by Quintus Curtius in his *History of Alexander the Great*, and described there in detail.[1]

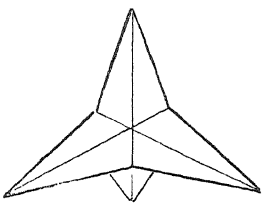

FIG 150 CALTROP, FIFTEENTH CENTURY

Coming to the eleventh century, Anna Comnena[2] describes how the Emperor Alexis prepared iron caltrops and spread them over the fields to break the attack of the Frankish horsemen. She adds that in emergencies the spurs of horsemen were used for the same purpose. Froissart,[3] writing three hundred years later, relates how spurs were buried in the ground, rowel upwards, to cause danger and "unpleasantness." Precisely the same designs are to be found in the fifteenth-century examples brought from the Castle of Rhodes by General Lefroy, and exhibited in the Tower of London.

Leonardo da Vinci (*circa* 1510) writes[4] that the caltrops should be carried by horsemen in a leather bag, and if the expected victory were turned to defence

> . . you should scatter them behind you. But should you have to cover the ground again (in a counter-attack) it is advisable to be prepared and shoe your horses with an iron plate between the hoof and the shoe.

The foot-soldier is advised to have an iron sole to his shoe or a sole of cloth woven with thick cords of cotton. William Horman[5] in his encyclopædic notes compiled in 1519 states: "They hydde prettily under the grounde Caltrappys of yron to steke in horse and mannys fete." In 1622, according to Francis Markham,[6] "Foards are soon choakt up with Calthorpes," thereby, of course, rendering the fords impassable for men, horses, and cattle long after hostilities had ceased.

They reappeared during the Crimean War, when they were strewn in front of the Bastion de Mat. Some of these were brought back and were deposited in the Rotunda Museum.[7]

Not long after Oliver Wendell Holmes records that in former days settlers in isolated houses in America used them as a protection against marauding bands of Indians.[8]

As subsequent wars were conducted in what may be termed, more or less, a sportsmanlike manner the caltrop disappeared till 1914, when the German invading cavalry scattered

[1] Book IV, 13, 36
[2] *Alexiad*, translated by E A. Dawes, p 124
[3] Translated by Lord Berners (1814 edition), IV, XIII, 36.
[4] *Leonardo da Vinci's Notebook*, edited by E MacCurdy, II, 181.
[5] *Vulgaria* (Roxburghe Club, 1519), p 385.
[6] *Five Decades of Epistles of Warre*, III, IX, 114
[7] *Catalogue*, XXX, 73–77.
[8] *Autocrat of the Breakfast Table* (The People's Library), p 278

them to cover the retreat of their scouts and vedettes To inconvenience infantry in the trenches or in 'No Man's Land,' numbers of caltrops were fixed to boards, one of which was taken by the Canadians together with man- or bear-traps at Vimy in 1917. All these later examples are exhibited in the Imperial War Museum.

Archers' Stakes and Swyne-feathers

At first these were simple defences for the archer, whose duty was to remain in action as long as he could use his bow with satisfactory results (Fig. 151)

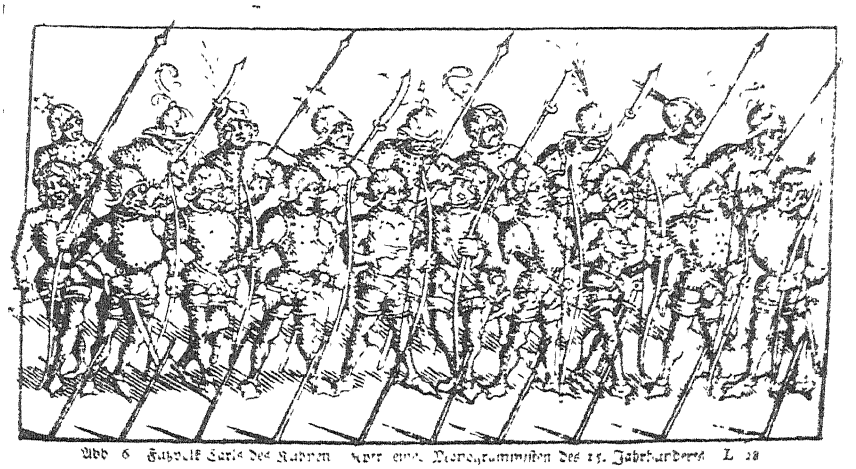

FIG. 151 ARCHERS' STAKES, FIFTEENTH CENTURY
From a German engraving

In 1373 the Duke of Bourbon, when besieging Belle-Perche, planted stakes six feet high and as thick as a man's arm, and placed them so that crossbowmen could shoot between them, and in front he strewed caltrops.[1]

Holinshed describes these stakes at the battle of Agincourt as follows [2]

> The King ordered his battle thus He caused stakes bound with iron sharpe at both ends of the length of five or six foot to be pitched before the archers and on each side of the footmen like an hedge, to the intent that if barded [armed] horses run rashlie upon them they might shortlie be gored and destroied Certain persons were also appointed to remove the stakes as, by the movement of the archers, occasion and time should require, so that the footmen were hedged about with stakes This devise of fortyfieing the army was at this time first invented

Leonardo da Vinci states that the Germans interweave their lances and stick one end in the ground and hold the other in their hands.

The following are entries in the *State Papers (Domestic)* and other contemporary records

1519. Giustinian, the Venetian Ambassador, describes the archer's equipment as breast-plate, bow, arrows, and two stakes, one before and one behind, with which they made palisadoes or stockades (S.P. (Dom.), 1519; 402).

[1] Jean Cabaret d'Orronville, *Vie de Louis de Bourbon*, XXVIII, 93
[2] *Chronicle* (1578 edition), III, Pt 1, p 553

1521. War munitions on board the *Henri Grace à Dieu* included 72 "fyldstakes" (S.P. (Dom.), 1521: 1128).

1523. Six thousand archer stakes scheduled at the Tower (S.P. (Dom.), 1523: 3351).

1529. Richard Rowley, engineer-blacksmith, received £6 13*s.* 4*d.* for 2500 sockets, rings, and staples of iron to garnish archers' stakes and 5000 archers' stakes garnished with heads and sockets, rings, and staples (S.P. (Dom.), 1531–32, vol. v, p. 313).

1531. Falier, the Venetian Ambassador, writes of the English Army:

> They have 60,000 infantry, who, although they fight in the old fashion with bow, arrow, sword, buckler, and sallet [celate] and a two-pronged iron stake to resist the enemy's horse, yet are they beginning to use harquebuses and artillery (State Papers (Venetian), 1531 694)

1547. After the death of Henry VIII a return was made of arms, armour, and artillery in all the fortresses, and under the headings Berwick, Pontefract, and Calais, numbers of 'fyldstakes' are recorded (Brander MS., Soc. of Ant.).

The dragoon, who was the prototype of the mounted infantry of recent years, was never a cavalryman, but used his horse purely for increased mobility. His equipment varied and, for a mounted man, was—to say the least of it—inconvenient. Sir William Throckmorton[1] included in their equipment

> two swyn feathers or foot pallisadoes 4 feet and a half in length headed by sharp forked iron heads six inches in length and a sharp iron foot to stick in the ground where as they may come to be forced to make resistance against horse

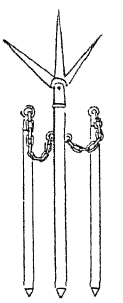

Fig 152 Swyne-feather, Seventeenth Century From Zeughaus, Prague

The illustration (Fig. 152) of the late seventeenth century in the Museum at Prague shows the forked head very similar to that of the true swyne-feather, which consisted of three spikes concealed in a tubular handle, which could be extended by a sudden jerk of the hand.

Gaya[2] speaks of the Baston à Deux Bouts used in 1678 as a staff 6½ feet long, with an iron point at each end He considers that this was a weapon, but it is more probable that it was a palisado.

In 1683 Sir James Turner[3] goes into detail as follows:

> I think I may, in this place, reckon the Swedish feather among the defensive arms though it doth participate of both defence and offence. It is a stake about four fingers thick with a piece of sharp iron nailed to either end of it by which it is made fast to the ground in such a manner that the other end lyeth out so that it may meet the breast of a horse whereby a body of musketeers is defended as with a pallisado against the rude charge of a squadron of horse Gustavus Adolphus was the first Swedish king that used them.

Movable Defences

The earliest of these machines were known as 'ribaudequins' and were generally on wheels, man-handled, and employed purely for defensive purposes. Froissart[4] describes them as "brouettes"—that is, wheelbarrows reinforced with iron, having long points in

[1] Sir W Throckmorton, Brit Mus Harl MSS, 6008
[2] *Traité des Armes* (1911 edition), p 38.
[3] *Pallas Armata*, p 176
[4] *Chronicle*, II, 205.

the front, used by the men of Ghent in 1382. There are several examples of those in use in the sixteenth century in the *De Rei Militari* of Valturius and elsewhere, one of which is portable but wheel-less (Figs. 153 and 154).

They were termed 'chevaux-de-frise' at a later date. Grose[1] gives an illustration of a

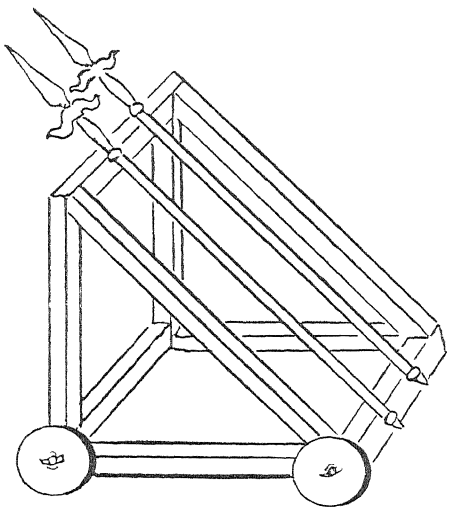

FIG 153 PALISADO, SIXTEENTH CENTURY
Valturius, *De Rei Militari*

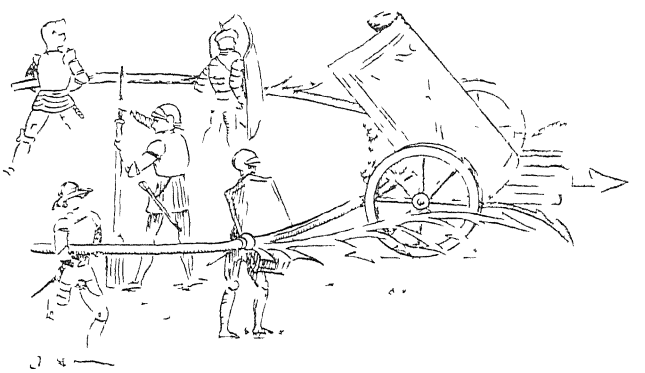

FIG 154 BOULTE, SIXTEENTH CENTURY
From an engraving by N Glockendon

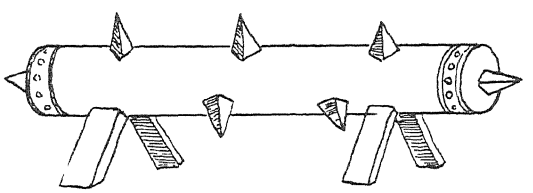

FIG 155 CHEVAUX-DE-FRISE SIXTEENTH CENTURY
Valturius, *De Re Militari*

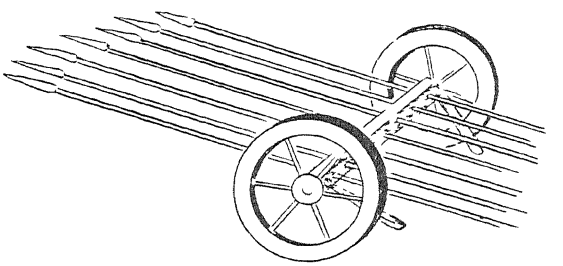

FIG 156 CHEVAUX-DE-FRISE EARLY EIGHTEENTH CENTURY
Grose, *Military Antiquities* vol II

wheeled defence used for defending a pass, which may be dated in the early years of the eighteenth century (Fig. 156).

A more elaborate contrivance was the 'lyonois,' which used to be shown in the Great Storehouse of the Tower and was burnt in the fire of 1841. According to Grose, it was ordered, or possibly designed by Colonel (afterwards General) Debbieg, R.A., who was sub-engineer at Chatham in 1778 (Fig. 157).

The Rotunda Museum[2] exhibits a light, portable contrivance of iron, stated to have been invented by Maximilian Godfrey of France.

The chevaux-de-frise, a large edition of that shown in Fig. 155, is described in detail in the *Military Dictionary*, by an "officer" in 1702, under the heading "Turnpikes." They were "composed of a piece of wood cut in hexagonal form, every side bored with holes . . . all different posited. Through the holes pikes are run, thus the points stand out

[1] *Military Antiquities*, vol II, Plate IV

[2] *Catalogue*, XXX, 70–72.

every way and are of great use to stop the enemy." One of them was, and possibly still is, in the War Museum at Gratz (Fig. 158).

In the Tower collection are two types of movable defences of the early nineteenth century composed of pikes. The one is formed of partizans joined in pairs (Fig. 159) and the other sergeants' spontoons with double struts.

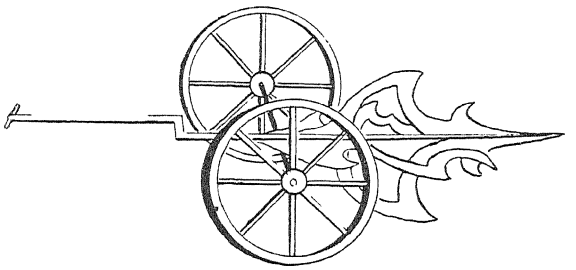

FIG 157 'LYONOIS,' CIRCA 1770
Grose *Military Antiquities*, vol II

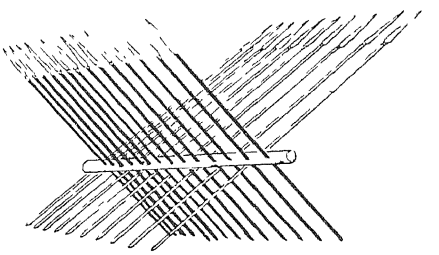

FIG 158 CHEVAUX-DE-FRISE, 1702
From Zeughaus, Gratz

Fixed Defences

Stakes, Pitfalls, Land-mines, Concrete. It is not the present intention to discuss stockades as part of fortifications, but rather to describe defences set up, in emergency, to deal with attacks, chiefly of armoured vehicles, or large bodies of infantry. The earliest of these were the stakes set in the river by Cassivellaunus against the attack of Cæsar's legions. Cæsar[1] writes: "The bank was fortified with a fringe of sharp projecting stakes and stakes of the same kind fixed under water were concealed by the stream."

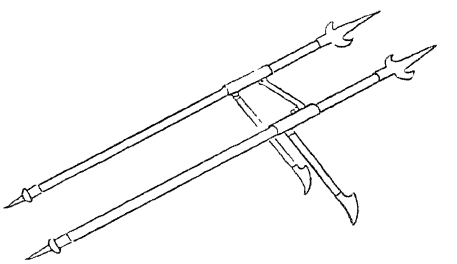

FIG 159 CHEVAUX-DE-FRISE OR SERGEANT'S PIKES, CIRCA 1820
From the Tower Armouries

Frontinus in his *Strategematica* (A.D. 70–80) describes these stakes, and states also that Sulla used them against the scythe-bearing chariots of Archelaus. They were so placed that the foot-soldier could pass between them. These stakes were, apparently, used in the fourteenth century, for the illumination (Fig. 160) in the British Museum shows men hammering in such defences. It should be noted that the medieval miniaturists had no antiquarian knowledge, and invariably equipped classical troops in the dress of the artist's own period. Both Vegetius and Valturius give detailed illustrations of scythe-bearing chariots which were used well into the sixteenth century.

And there our records of these defences stop short—to be resumed in 1916, when the tanks made their unexpected appearance. At first the only defences attempted were pitfalls and land mines (Fig. 162), but as soon as the tank became an accepted fact Germany went straight back to the fourteenth century, if not to Cassivellaunus, and planted forests of great posts or barriers with spikes at bridgeheads or in narrow roads (Fig. 161).

In 1917 Admiral Sir Reginald Bacon[2] proposed an elaborate scheme of convoying tanks,

[1] *De Bello Gallico*, V, 18, translated by H J. Edwards, 1919
[2] *The Dover Patrol*, vol. I, p 240

artillery, and infantry in great pontoons, pushed by monitors, to effect a landing on the Belgian coast The plan was never carried out, but the Germans were taking no risks, and studded the stone ramp of the Ostend front with iron railway lines with sharpened points (Fig. 163).

By 1937 the tank and its possibilities were being taken still more seriously, and the whole

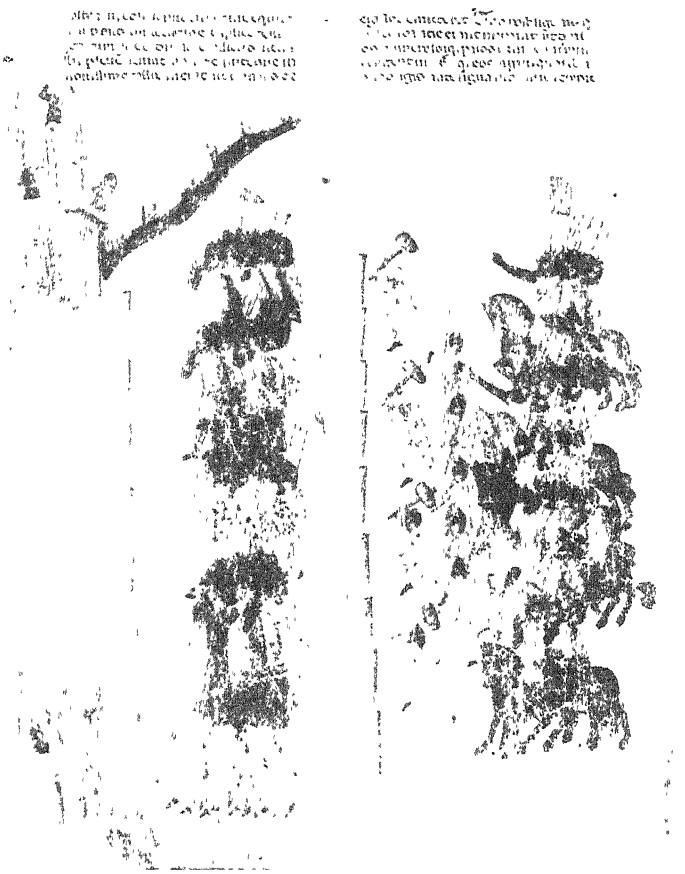

FIG 160 FOURTEENTH-CENTURY MANUSCRIPT SHOWING THE USE OF STAKES
Frontinus *Strategematica* (Brit Mus Add MSS 44937)

of the new Hindenburg Line was fronted with thousands of reinforced concrete pylons which would form an impenetrable barrier (Fig. 164).

Belgium followed suit in 1938, more economically, with iron railway lines and barbed wire (Fig. 165).

Barbed Wire

It is difficult to justify the inclusion here of this form of defence, as most wire defences are more or less permanently fixed and are intended as defences solely against infantry, for the tank could make very short work of such obstructions. But as they seem to combine

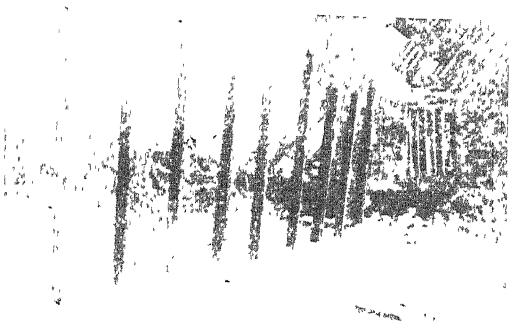

FIG. 161 GERMAN ANTI-TANK DEFENCES, 1916

FIG. 162 GERMAN ANTI-TANK DEFENCES, 1916

Crown copyright, Imperial War Museum

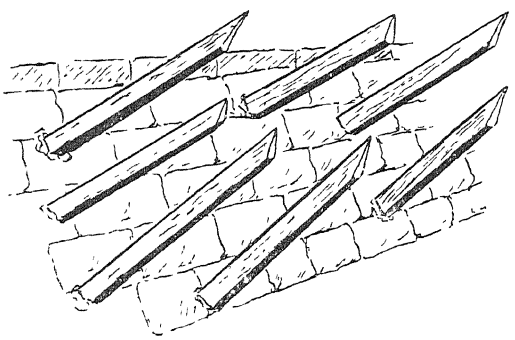

FIG. 163 OSTEND FRONT, 1918

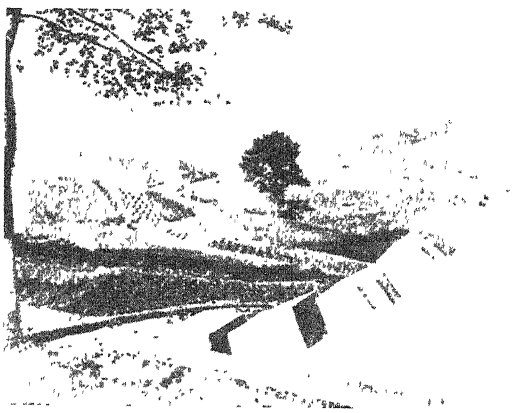

FIG. 164 THE HINDENBURG LINE, 1937

Photo Associated Press

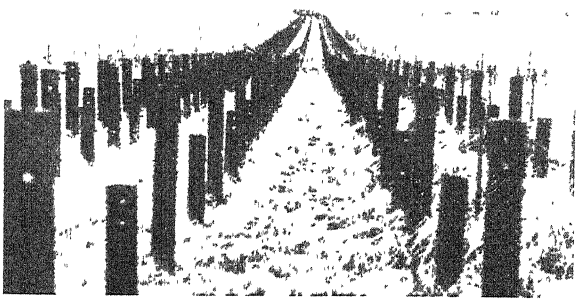

FIG. 167 BELGIAN ANTI-TANK DEFENCES, 1938

Photo Sport and General

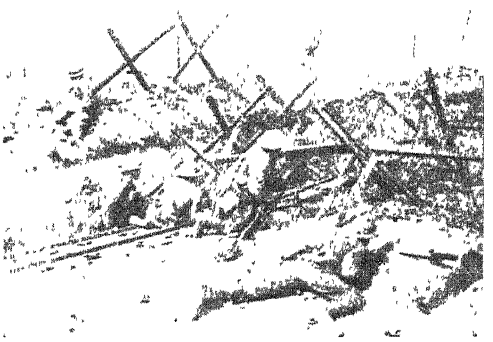

FIG. 166 BARBED WIRE, 1915

Crown copyright, Imperial War Museum

the caltrop and the palisado and are so much a part and parcel of all war operations, this new defence merits a brief notice. The invention of twisted wire studded with barbed points is credited to Lucien Smith, of Ohio, who took out an American patent in 1867. This was followed by a patent taken out in 1874 by J. Gilden, for making barbed wire in large quantities. The first English patent was taken out by D. Hunt in 1876 (No. 4357).

It was primarily used by cattle ranchers in America, and in the Spanish-American War of 1898 Roosevelt's Rough Riders introduced it as a protection for camps.[1] Its general appearance and use are so well known that there is no need to go into details. At the same time, it is of some interest to note that the 'knife-rest' shown in Fig 166 is very similar in form to the chevaux-de-frise.

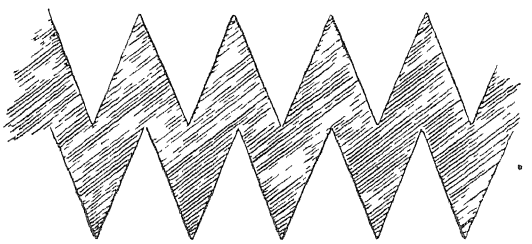

FIG 167 GERMAN STAMPED STEEL

In the days of acute shortage in Germany it was difficult to carry out the complicated operations necessary for the manufacture of barbed wire, and therefore much was made of stamped sheet iron with $\frac{3}{4}$ inch spikes (Fig. 167), which, after manufacture, were bent at various angles.

During the war of 1914–18 a material called 'kapok' was invented which is impenetrable by barbed wire, but clothing and gloves of this material were so hot and inconvenient that men preferred to use bare hands. They became used to handling the wire between the barbs, and trusted to artillery or tanks to demolish it. No figures are available for the output of barbed wire between the years 1914 and 1918, but the vast volume used in 1937 may be gauged by the present world output of over 200,000 tons a year

[1] C Morris *The American War with Spain*, p 241

CHAPTER XI

FIRE, SMOKE, GAS

Fire

In former sections the merits and demerits of various weapons and the use of mobile war vehicles have been discussed together with the defences contrived to meet new conditions of warfare. This being, essentially, a record of the arms and equipment of the Army it may well be left to other writers to deal with the hundred interesting points connected with war at sea and in the air; but there is one factor which, as far as I am aware, has not been dealt with historically, and that is what may be generalized as incendiary compositions used in military operations.

The use of fire for domestic purposes can be traced back almost, if not quite, as far as the beginnings of *Homo sapiens*; but it was only when men in more or less organized tribal bodies fought and attacked houses and fortifications of wood that fire came to be employed in warfare.

The earliest illustration we have of fire being used for attack and defence is found on one of the bas-reliefs in the British Museum, brought from Nineveh by Sir Henry Layard in 1848–49. This depicts the siege of Lachis by Sennacherib in 701 B.C. Here the defenders of the castle are showering torches on the besiegers, who are endeavouring to pierce the walls with mobile battering-rams. These are set in a vehicle, apparently constructed of a framework on wheels covered with hides laced together, the whole machine bearing some likeness to the modern armoured car or tank. In order to counter the danger from fire, one man in each vehicle has a long-handled ladle with which he pours water on to the ram. Very properly the mobile ram carries an archer (fire-power) and is backed by large bodies of infantry archers (Fig. 168).

Putting aside the Homeric and the Virgilian poems as mythical, and not descriptive of authentic history, the first record we have of the use of fire in actual warfare is to be found in the *History of the Peloponnesian War*, by Thucydides,[1] who, in describing the siege of Delium in 424 B.C., recounts how the Boeotians made an engine formed of a great beam, hollowed out, from which projected an iron tube, at one end of which hung a cauldron of lighted charcoal, sulphur, and pitch. Great bellows were applied to the outer end, with the result that a terrible fire burned the wall—presumably a stockade—and put to flight the defenders. Here the sole object of the attackers would seem to have been incendiarism, as there is no suggestion that smoke or asphyxiating fumes formed part of this method of attack.

Æneas Tacticus, writing about the year 350 B.C.,[2] describes the incendiary composition in use at this time as a mixture of sulphur, pitch, pinewood charcoal, incense, and tow, and he states that this was contained in egg-shaped vessels of clay which were thrown, lighted, into enemy ships. These were the forerunners of the 'carcasse,' a kind of incendiary bomb used in different forms from the sixteenth to the twentieth centuries, the last mention of the word occurring in the official treatise on ammunition in 1897. This incendiary composition came to be known as 'Feu Gregois' or 'Greek fire,' and, presumably, the simple

[1] Translated by R. Crawley (1874), p. 314.
[2] *Poliorketikon.* (L. W. Hunter, *Æneas on Siegecraft* (1927), pp. xxxv, 93).

ingredients mentioned by Æneas Tacticus must have been added to, for the Emperor Constantine Porphyrogenitus, writing to his son in the tenth century A.D., states that the secret of this liquid fire was revealed six hundred years previously to Constantine the Great by an angel, on the distinct understanding that it should be used only by Christians and

FIG 168 INCENDIARIES, SIEGE OF LACHIS, 701 B.C.
By courtesy of the British Museum, from an Assyrian sculpture

that the curses of God would fall on whoever revealed it to a foreign (presumably infidel or heathen) nation [1] Whether the angel based his formula on the prescription of Æneas Tacticus, who wrote when Constantine the Great flourished, we, naturally, are not informed It is possible, however, that the secret so jealously guarded was naphtha, or some kind of oil, added to the above-mentioned composition.

In 1106 Anna Comnena describes Greek fire as composed of resin and sulphur which was blown through a reed and ignited as it emerged, a risky process for the operator.

[1] Meursius, "De administrando Imperio," in *Omnia Opera*, vol VI, Chapter XIII, p 954 (1745 edition).

In 1108, when the Franks besieged Durazzo, they undermined the walls to obtain entry behind the fortifications, but the defenders under Alexis made a counter mine and, when they met the attacking miners, blew a mixture of lighted resin and naphtha through tubes, thereby destroying the raiding party.[1]

De Joinville, in describing the siege of Damietta in 1249, writes that the Saracens brought up a machine which seems to have been a species of rocket "like a dragon flying through the air making a noise like thunder."[2]

Hassan Alrammah, writing in the thirteenth century, in his *Treatise on the Art of Fighting*, gives very full details of Incendiary Warfare. Arrows, maces, and lances with inflammable heads were frequently employed, together with small receptacles of glass or clay used as hand-grenades together with large cases discharged from catapults or ballistae (Figs 168 and 169). From the various names which are given to these weapons, such as "de Chine, de l'Irac, and du Katay,"[2] it may be assumed that they had originated as far East as China. One of the writers quoted by Reinaud urges that the wielders of incendiaries should be very careful of wind and sparks, as the fire could not be extinguished by water. He describes a form of protection when an attack by incendiaries was threatened consisting of a doublet soaked in vinegar, red clay, and glue (Fig 171). He also suggests

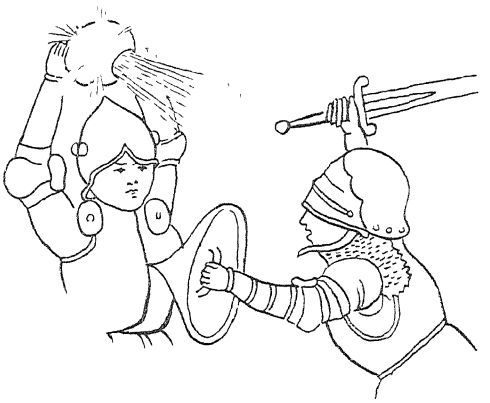

FIG 169 INCENDIARY BOMB, FIFTEENTH CENTURY
From the British Museum (Roy MS 18 E V)

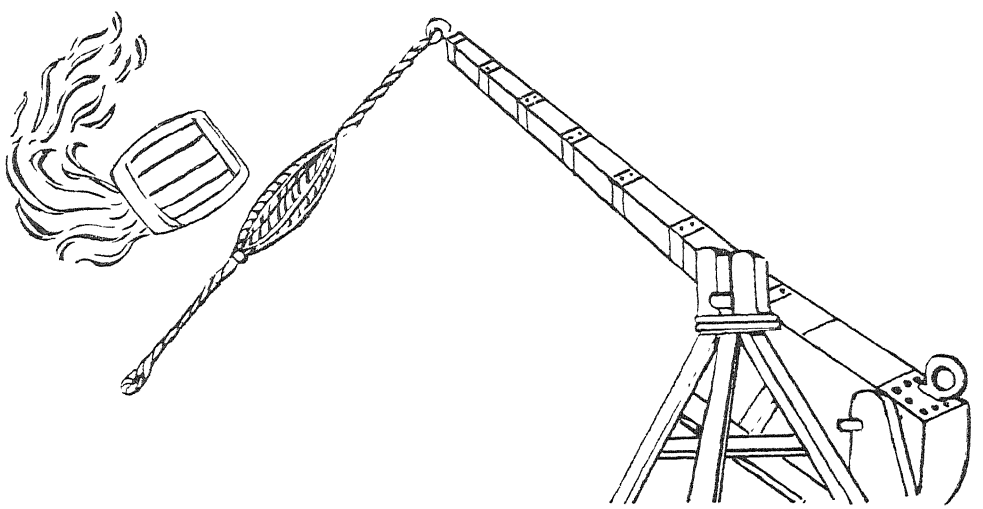

FIG 170 BALLISTA WITH INCENDIARY, CIRCA FOURTEENTH CENTURY
Bib. Nat. Paris (7239, fol 109)

[1] *Alexiad*, trans E Dawes, Book XIII, p 329
[2] Jean de Joinville *Memoirs of the Crusades*, edited and translated by Sir F. Marzials (1908)

that to create panic a man wearing a helmet covered with a cloth soaked in lighted naphtha and carrying a fire pike might ride down the lines (Fig. 171).[1]

Froissart gives an account of the siege of Oudenarde in 1379, when cannon throwing great arrows of fire were employed to set fire to the thatch of houses within the town, but

FIG. 171. FIRE PIKE, FIFTEENTH AND SIXTEENTH CENTURIES
Bib. Nat., Paris (7239, fol. 72)

FIG. 172. INCENDIARIES, 1300
Arab MS. in Bib. Nat., Paris

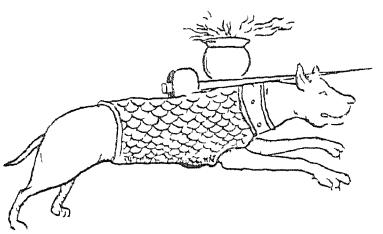

FIG. 173. DOG WITH INCENDIARY
Bib. Hauslab, Vienna

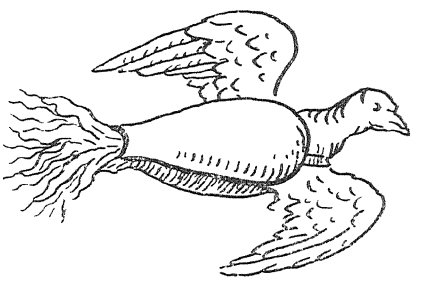

FIG. 174. BIRD WITH INCENDIARY

like their descendants nearly six hundred years later the inhabitants covered their houses with great mounds of earth. In 1370 John Ardene, who has been quoted at page 92, suggests that bows, crossbows, and, indeed, birds and animals could be used to carry an incendiary composition enclosed in iron or brass containers (Figs. 173 and 174). In 1383, when the Bishop of Norwich besieged Ypres, the Flemish garrison defended themselves with fire arrows and fire lances so valiantly that the English retired, leaving their great siege guns behind.

[1] Reinaud et Favé, *Du Feu Gregois* (1847)

The various compounds mostly for incendiarism were used particularly in naval and siege warfare well into the seventeenth century, the attacking force projecting the carcasse from ballistae while the defenders poured blazing torrents through the machicolations of the castle wall.

While these methods of warfare lasted it is but natural to find that the incendiary arrow shot from long-bow or cross-bow was used to produce good results on a small scale. These forms of weapons for long-distance attack can be traced back to a very early date, when fortifications consisted principally of wooden stockades. They were of appreciable value if used in sufficient numbers. Matthew Paris[1] records how at the siege of Damietta in 1249 fiery darts and little containers filled with quicklime were discharged from bows. These missiles evidently formed part of military equipment, for they were scheduled as "arrows with wild fire" in stores at Newhaven and Berwick in 1547.[2] In one of his voyages Sir John Hawkins describes the use of these fire arrows as useful for damaging the sails and rigging of the enemy, "to tease or spoyle his tackling and sayles . . . arrows of fire to bee shott out of slur-bowes"[3] (Fig. 174). In 1628 an anonymous author produced "A New Invention for shooting Fire-shafts in Long-bows." He states that a tube of latten (brass) should be filled with a mixture of green powder, saltpetre, and camphor which before discharge should be lighted by the slow match which was always carried by musketeer and artillery man. Neade, in his *Double-armed Man* (1625), states that he had himself shot an ounce of firework 240 yards, and twenty years later Thomas Smith includes 'fireworks' from guns and bows in his treatise on the art of gunnery (1643) (Fig. 176). Gaya gives several recipes for what he describes as "feux d'artifice," but they are chiefly devoted to petards, grenades, and mines. He mentions the 'lance à feu' but it is not quite clear whether this is merely the port-fire used instead of the match for firing cannon or whether it could be used for incendiary purposes like the fire pike. His list of compounds for these included saltpetre, camphor, sulphur, linseed oil, liquid varnish, Venice turpentine, pitch, brandy, vinegar, powdered glass, charcoal, aqua fortis, and "huile de petrol."[4]

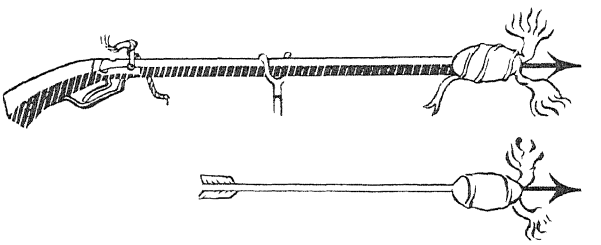

FIG. 175 INCENDIARIES FROM GUN AND BOW, SEVENTEENTH CENTURY
T. Smith, *Art of Gunnery*

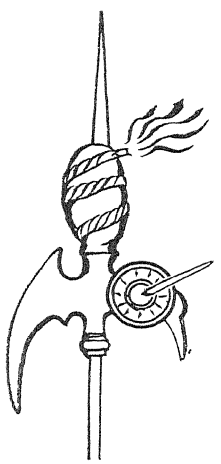

FIG 176 FIRE HALBERD, SIXTEENTH CENTURY
T Smith, *Art of Gunnery*

The last we hear of an attack by fire weapons is in the account of the siege of Bristol in 1643,[5] when Prince Rupert records that one, Captain Clerk, attacked with fire pikes the which neither men nor horses could endure, and on another occasion Colonel Littleton, "ryding along the inside of the line with a fire pike, quite cleered the place of defendants, some of them crying out Wyld Fire, Wyld Fire."

[1] *Additamenta* (edit 1649), p 166.
[2] Brander MS , Society of Antiquaries.
[3] *Voyage into the South Sea* (1593), Hakluyt Society (1847).
[4] *Traité des Armes* (1678), edited C. ffoulkes (1911)
[5] Eliot Warburton, *Memoirs of Prince Rupert and the Cavaliers* II, 236–64.

After this date there was a lull in incendiary warfare, but inventors were not oblivious to its possibilities. In 1702 P. Large experimented with a 'Serpent-Spray' of fire, but this does not appear to have been a practical proposition, as it was abandoned in 1704, one drawback being that it needed four men to carry the apparatus.[2] But, still harking back to the Greek fire of the ancients, inventors were conducting experiments, the last of which was the construction of a pump to project streams of blazing oil or petrol, produced in 1871 during the siege of Paris. This was never employed till after the siege, but the Communists discovered the appliance and used it for the destruction of palaces and public buildings.[1] In the early years of the twentieth century Leidler was more successful, with the result that the Flammenwerfer of 1915 came into existence.[2] And here our records must cease, as after this the military flame-thrower must be dealt with technically by others.

As the intention of the present work is to trace the history and evolutions of army weapons and equipment no attempt has been made to deal with the numerous records of Greek Fire and incendiaries used in naval engagements which culminated in the fire ships sent against the Spanish Armada in 1588, and later in Captain Cochrane's attack on the French fleet in the Basque Roads on April 11, 1809, with eight fire ships and three vessels laden with 1400 barrels of powder, 400 shells, and thousands of hand-grenades.

Smoke and Gas

There is little to be found in historical records of the use of smoke for concealment. As noted at page 104 it was used for signalling at a very early period, but no military writer has suggested that smoke might be used to cover advancing troops. Indeed, in the early days of firearms the smoke of cannon and musket, especially with the wind blowing from the enemy's lines, was often more of a hindrance than an advantage, as it concealed the enemy, who always fired in close order at short range, and blew back on artillerymen and musketeers when they were actively employed in loading their pieces. Dundonald's scheme for attacking Cronstadt in 1855 is really the first official suggestion of its uses. In 1873 a parachute was used which contained a paper shell filled with powders, saltpetre, sea coal, pitch, and tallow. "It was employed for throwing into mines to suffocate or expel the working parties, also to conceal your position from the enemy."[3]

Asphyxiating or lachrymatory gas does not seem to have been used except in conjunction with Greek fire.

The earliest record we have of some form of poison gas is to be found in the account of the siege of Jerusalem in A.D. 70, when decomposing corpses were hurled into the city by ballistae to spread disease and panic.

In a work on tactics by the Emperor Leo VI,[4] who flourished in the ninth century, he describes the use of earthen pots filled with wet quicklime to stifle and choke the enemy, and he further suggests hurling scorpions and poisonous reptiles for the same purpose. The throwing of corpses into a town seems to have been a recognized form of siege warfare as late as 1340, when the Duke of Normandy made use of it at the siege of Thun L'Eveque.[5] There is a legend that in one of the Spanish landings in South America

[1] Bartelot *Revue des Deux Mondes* (1891), p. 792.
[2] Hausenstein, *Zeitschrift fur das gesamte Schiess und Sprengstoffwesen* (1939).
[3] Lieutenant-Colonel C. H. Owen, *Principles and Practice of Modern Artillery*, p. 127.
[4] *Tactica* XIX, Sect. 54, 55 (1612 edition).
[5] Froissart, *Chronicle*, vol. 1, p. 145 (edit. 1814).

the natives threw gourds filled with red pepper—perhaps the first attempt to employ lachrymatory gas.

In his chapter on explosives Deane states that up to 1858 no incendiary shell worth considering had been produced, but that the French were experimenting with "grenades asphyxiantes" which are in course of trial by our present Ordnance authorities.[1]

The penultimate suggestion of using this form of attack occurs in 1812, when Cochrane (afterwards Admiral Lord Dundonald) put forward his "Arcanum" or "Secret Plan."[2] There are no exact details of the working out of his idea, but there is a certain amount of information to be found in the Dundonald Papers in the Public Record Office.[3] The plan was submitted to the Prince Regent in 1811, who formed a committee consisting of himself (in the chair), the Duke of York,[4] Admiral Viscount Keith, Admiral Viscount Exmouth, and the Congreves, father and son, the last-named being the inventor of the war rocket which bears his name. The committee agreed as to the destructive character of Dundonald's plan, but considered that as there was great danger in this new form of warfare being used by an enemy the papers should be ordered to be sealed up and marked "Secret." And there the matter rested until 1845, when Dundonald obtained the appointment of another committee, which was convened on September 8, 1846, under the chairmanship of Sir John Burgoyne, Inspector-General of Fortifications. Captain Sir Thomas Hastings, R.N., and Lieutenant-Colonel J. Colquhoun, R.A., served with him, and Mr Faraday, the distinguished chemist who discovered chlorine and other gases, was called in to give expert advice. Though no exact formula is given in the Record Office papers, Dundonald seems to have gone back to the Bœotians and to have suggested the vaporizing of sulphur over a coke fire.

The complete plan consisted of small vessels, drifted by wind or current inshore, making a smoke screen of soft bituminous coal, and these were followed by old iron colliers bearing the stores of coke, stoves, and sulphur. Attached to the papers is a map of Cherbourg, but no reference is made to this in any of the discussions or memoranda.

Again the subject was dropped, and again, at the outbreak of the Crimean War, Dundonald revived his plan, with the definite object of attacking the fort and shipping at Cronstadt. He gave a rough estimate of his requirements: twenty-four vessels at £3000 each, coal for each £300, sulphur (200 tons) £200—grand total £200,000, the personnel to work the smoke screen and sulphur ships being put at 144 officers and men. The Ordnance Memorandum on the subject states that the sulphur vapours would certainly deprive the gunners of life or paralyse them or drive them away, but it adds that the whole plan is barbarous and uncivilized. This criticism is still more forcibly expressed by Reinaud and Favé, writing in 1845,[5] with presumably no knowledge of Dundonald's "Arcanum," or "Secret Plan" They consider that the Greek fire of the Byzantine destroyed all and every ideal of chivalry and religion and rendered useless the courage and strength of the individual.

Dundonald was asked several questions and, though his replies are not tabulated, one can gather, from letters attached to these papers, his views. He was asked if he had tried experiments on animals, and his reply was that he had visited the sulphur mines in Sicily where the natives were forbidden to reside within three miles "on account of the pernicious

[1] *Manual of Firearms* (1858), p 87.
[2] Lord Dundonald, *Autobiography of a Seaman* (1861), p 411 *et seq*
[3] P R O, Adm 1/5632
[4] Frederick Augustus, Commander-in-Chief
[5] *Histoire de l'Artillerie*, Part I, p 210

vapour," and he therefore considered that no experiment was necessary. He was asked how he would protect his own men if the wind shifted, and he seems to have suggested vaguely damp cloths.

Faraday's report is that of a practical man and not a mere theorist. He considered that sulphur fumes would probably spread in the mile between the attackers and the fort and, being heavy, would not rise more than about fifteen feet; it would accordingly be of little use against the gunners in forts or in warships, who, for the most part, would be above this limit. There was also the difficulty of foretelling with exactitude the direction of the wind on a particular day, a difficulty experienced in the war of 1914–18 in spite of the advance made in meteorological science. Eventually the whole scheme was turned down, but it is not stated what were the principal reasons against its adoption. These may be suggested, but those actually given were not necessarily in this order:

(1) Considerations of humanity.
(2) Uncertainty of wind.
(3) Absence of any form of gas-mask for those carrying out the operation.
(4) Expense.
(5) Possible retaliation.

The last paper in the file is a memorandum to the First Lord of the Admiralty, dated October 27, 1924.

These papers were brought to Mr Churchill early in the war (1915–16), who said that we were confined to a limited sphere of International Law till Germany forced us to take reprisals in the matter of poisonous gas.[1]

It should be remembered that until 1899 there was no international decision as to the recognized methods of waging war, and that therefore the Dundonald Plan would not have infringed any agreement or undertaking.

In conclusion, it may be of some interest to record the attitude towards new methods of warfare through the centuries:

A.D. 400. Greek Fire should only be used by Christians against infidels.
1139. Pope Innocent II condemns the cross-bow and Greek fire as "unfair weapons" and considers that they should be used only against infidels.
1718. James Puckle invents a flintlock machine-gun designed to fire round bullets against Christians and square bullets against Turks.
1895. The St Petersburg Convention forbade the use of explosive bullets.
1899 First Hague Conference declares as illegal the throwing of missiles from balloons, poison gas, and expanding bullets.
1907. Second Hague Conference deals with the laying of submarine mines, bombardment of undefended towns, and other kindred matters.

[1] This must have been very early in 1915, for Germany, dishonouring her signature to international treaties which prohibited the use of such weapons, first used the flame-thrower on February 26, 1915, and followed this with the first gas attack at Ypres on April 22 of the same year.

CONCLUSION

And so this series of martial wheels turns full circle—the elephants of Hannibal and the scythe chariots of the Iceni lead us step by step to the tank; the river stakes of Cassivelaunus in the Thames and the archers' stakes at Agincourt become the anti-tank defences of the Siegfried Line and the barbed wire of trench warfare, and, lastly, the sulphur fumes of the Boeotians culminate in the smoke screen, the flame-thrower and the gas-projector. An entirely new factor has come into being during the present century with aeronautics; but even here the same weapons and appliances, the firearm and the incendiary, are integral parts of their equipment. But still the issues of war must and always will be decided by the man with rifle and bayonet backed up by the scientist behind, devising for him new weapons and new defences against all and every form of unexpected attack. And what is the outcome of these thousands of years of war, this orgy of devastation and slaughter and misery? The historian of the future alone can tell us when the millennium may be reached.

But the history of the past tells us that in every century some nation, filled with a lust for expansion and domination, has prepared for the conquest of nations less well prepared. It may be that in the course of events the weaker nation may develop characteristics stronger and more potent than those of its opponents, thereby giving it at any rate temporary superiority, but whoever is the aggressor, the contest goes on. Speaking for ourselves, we have always been a peaceful commercial community, only stretching farther afield to increase our trade interests and not solely for conquest and the subjugation of others. As a proof of our pacifist life it may be pointed out that we have never had great arsenals in this country for accumulating arms, for from the sixteenth century right up to our own times we have imported the larger part of our armour and weapons from Europe.

So careless and economically minded were we that when Europe was arming with breech-loaders we, in order to save expense, adapted the Enfield rifle to take the Snider breech, and when Krupp was turning out breech-loading guns we lagged behind with counter measures. Indeed, as has been noted in a former chapter, in spite of the fact that Armstrong had produced a reliable breech-loading cannon in 1859 it took fifteen years to have the principle adopted for the Army, one of the reasons for procrastination put forward officially being that the change-over would be very costly. Whenever some new suggestion is made it is received coldly, though in a few cases popular indignation flares up—as it did over the sword and bayonet scandal of 1884; but with judicious handling the politicians quieted the clamour and the matter ceased to be of public interest. As early as 1871 we were warned by Sir George Chesney, who foresaw the threat of sudden invasion in his remarkable and almost prophetic story of *The Battle of Dorking*, of which well-nigh a hundred thousand copies were issued. Here he describes graphically our tragic unpreparedness, the enemy landing, and peace being signed in Whitehall. Indeed, it might almost have been written in the early days of 1940. Forty-three years later, in the first days of the so-called "Great War," London was plastered with the slogan "Business as usual," and it was only Lord Haldane's prevision in forming the Territorials which saved us at a critical period. Our former enemies, however, had their own version of the Armistice, and at once began, with money borrowed from us and from America, to rearm for the next

war, while only a few prophets like Lord Roberts, Mr Churchill, and Lord Lloyd warned us of what they considered would assuredly happen

Party succeeded party in the general elections, and as it was ourselves, as the electors, who put each party in office, we are directly responsible for the Government we chose Each party was firmly committed to the policy of no rearmament—indeed, one leader called for "Scholarships, not Battleships," and another frankly admitted that any suggestion of rearmament would lose his party the election.

In our own homes we bolt our doors and install burglar-alarms against personal attack, but as a nation we leave our doors wide open and our windows unlatched Perhaps, it is to be hoped, in the near future the keys will be turned and the windows barred

And here we must leave this all too brief summary of the Arms and Armaments of our Army with the warning given over two thousand years ago, "When a strong man armed keepeth his palace, his goods are in peace," and nearer our own time, in his speech to Congress on January 8, 1790, when George Washington said, "To be prepared for war is the most effectual means of preserving peace" As a last word we may quote the motto given many years ago by the Lords of the Admiralty to the Royal Naval College, Dartmouth.

SI VIS PACEM PARA BELLUM

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